DISSERTATION TITLED

"COMPARISON OF OUTCOME OF SEPTOPLASTY AND SEPTOPLASTY COMBINED WITH INFERIOR TURBINOPLASTY IN CASES OF DEVIATED NASAL SEPTUM WITH INFERIOR TURBINATE HYPERTROPHY"

Submitted in partial fulfilment of

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THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

CHENNAI

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CERTIFICATE

This is to certify that the dissertation entitled **"COMPARISON OF OUTCOME OF SEPTOPLASTY AND SEPTOPLASTY COMBINED WITH INFERIOR TURBINOPLASTY IN CASES OF DEVIATED NASAL SEPTUM WITH INFERIOR TURBINATE HYPERTROPHY"** is a bonafide work done by **Dr.R.VIJAY PRADAP**, Post Graduate Student, Upgraded Institute of OtoRhinoLaryngology, Madras Medical College, Chennai-3, in partial fulfillment of the University Rules and Regulations for the award of MS Branch –IV **OTORHINOLARYNGOLOGY**, under our guidance and supervision, during the academic year 2011 – 2014.

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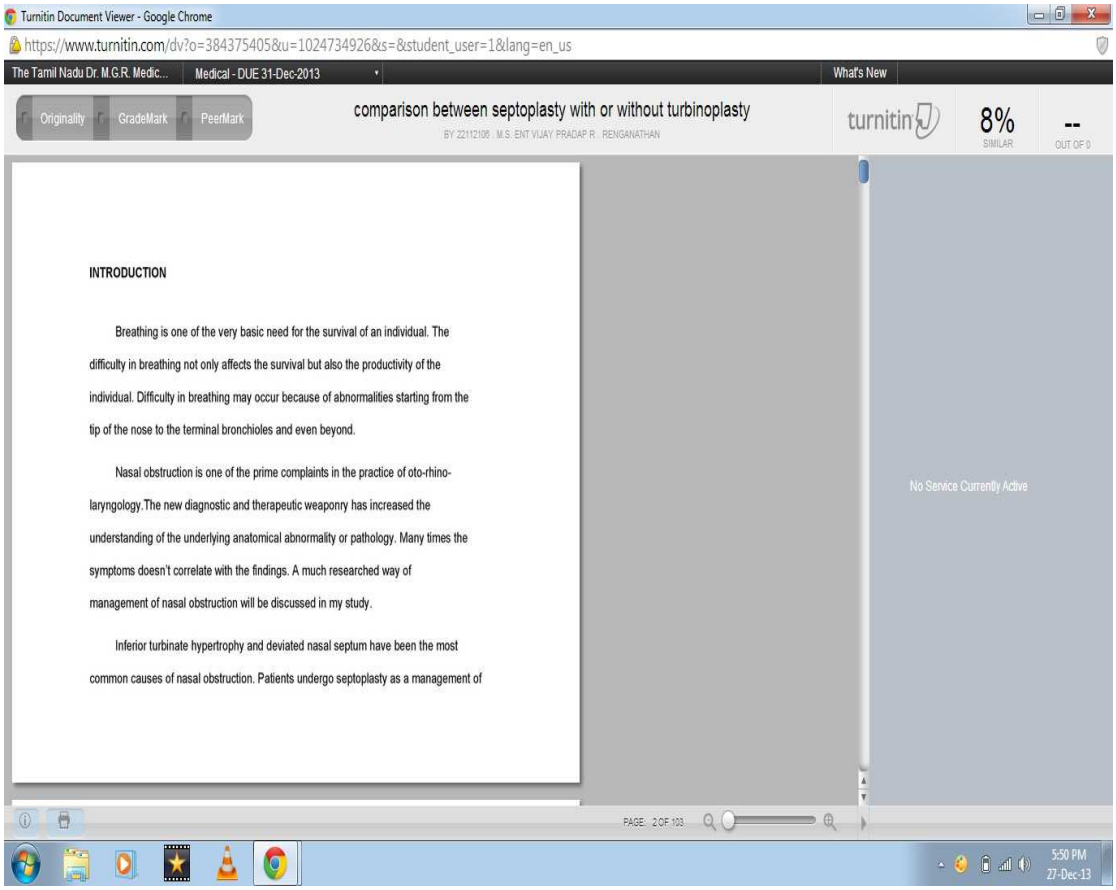
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INTRODUCTION
Breathing is one of the very basic need for the survival of an individual. The difficulty in breathing not only affects the survival but also the productivity of the individual. Difficulty in breathing may occur because of abnormalities starting from the tip of the nose to the terminal bronchioles and even beyond.
Nasal obstruction is one of the prime complaints in the practice of oto-rhino-laryngology.The new diagnostic and therapeutic weaponry has increased the understanding of the underlying anatomical abnormality or pathology. Many times the symptoms doesn't correlate with the findings. A much researched way of management of nasal obstruction will be discussed in my study.
Inferior turbinate hypertrophy and deviated nasal septum have been the most common causes of nasal obstruction. Patients undergo septoplasty as a management of
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ABBREVATIONS

Pre op – pre operative

Post op – post operative

DSR – Deviated nasal Septum to Right

DSL – Deviated nasal Septum to Left

ITH – Inferior Turbinate Hypertrophy

DNE – Diagnostic Nasal Endoscopy

ADEQ – Adequate

INADEQ – Inadequate

NAS.OBS – nasal obstruction

FA.PAIN – facial pain

DIFF. IN SLP – difficulty in falling asleep

RED.CONC – reduced concentration

IRRI – irritability

RT – Right

LT - Left

ABSTRACT

TITLE: Comparison of outcome of septoplasty and septoplasty combined with inferior turbinoplasty in cases of deviated nasal septum with inferior turbinate hypertrophy

BACKGROUND: Inferior turbinate hypertrophy and deviated nasal septum have been the most common causes of nasal obstruction. Patients undergo septoplasty as a management of deviated nasal septum yet they complain of nasal obstruction. This is mostly because of the inferior turbinate hypertrophy. My study is about the additive effect of inferior turbinoplasty when combined with septoplasty

OBSERVATON AND RESULTS: A study was conducted on 50 patients of which 25 patients were control group who have undergone septoplasty and the other 25 patients were test group who have undergone septoplasty and inferior turbinoplasty. The symptom scores and DNE were done 6 months post op. Results were as follows. Taking the symptoms like nasal obstruction, facial pain, difficulty in falling asleep, reduced concentration and irritability into account the total symptom score improved by 47.04% in test group and it has improved by 25.79% in control group. The post operative DNE is adequate both nasal cavities in all test patients while it is

adequate on right side in 5 patients and in 9 patients on the left side of the control population. There is a gross improvement of nasal obstruction in the test group by 54.34% while it is 23.52 in control group. Facial pain, difficulty in falling asleep, reduced concentration and irritability have improved by 48.14%, 45.67%, 46.57% and 35.44% in test group and it is improved by 30.66%, 22.5%, 27.94% and 25% in control group respectively.

CONCLUSION: Symptomatically exciting improvement is observed in the test group who have undergone septoplasty with inferior turbinoplasty both immediate as well as long term than those patients who have undergone septoplasty alone. Hence turbinoplasty is a useful adjunct procedure to septoplasty producing excellent results. There is also an appreciable increase in nasal breathing space as observed in preop and post op DNE findings in the test group in comparison with the control group. The associated morbidities of inferior turbinate surgeries like atrophic changes, crusting and exposure of bare bone which is common in other extensive inferior turbinate procedures is very negligible in submucosal debridement of inferior turbinate.

KEY WORDS: Turbinate reduction, turbinoplasty, septoplasty with turbinoplasty, microdebrider assisted turbinoplasty, powered turbinoplasty, septoplasty.

CONTENTS

INTRODUCTION

Breathing is one of the very basic need for the survival of an individual. The difficulty in breathing not only affects the survival but also the productivity of the individual. Difficulty in breathing may occur because of abnormalities starting from the tip of the nose to the terminal bronchioles and even beyond.

Nasal obstruction is one of the prime complaints in the practice of oto-rhino-laryngology.The new diagnostic and therapeutic weaponry has increased the understanding of the underlying anatomical abnormality or pathology. Many times the symptoms doesn't correlate with the findings. A much researched way of management of nasal obstruction will be discussed in my study.

Inferior turbinate hypertrophy and deviated nasal septum have been the most common causes of nasal obstruction. Patients undergo septoplasty as a management of deviated nasal septum yet they complain of nasal obstruction. This is mostly because of the inferior turbinate hypertrophy. The diagnostic nasal endoscopy will show difficulty in first pass. Modern pharmacological agents offer an alternative conservative management in turbinate reduction. But it is temporary. The nasal obstruction may recur after the stoppage of treatment. The alternative

treatment for inferior turbinate hypertrophy is turbinate reduction procedures. Total turbinectomy may look fancy initially as it relieves the nasal obstruction immediately but later chances of crusting, atrophic rhinitis are more with this procedure. There are a lot of procedures for turbinate reduction as follows

TURBINATE REDUCTION PROCEDURES

a. Resection procedures

b. Non resection procedures

Resection procedures:

a. Partial inferior turbinectomy

b. Subtotal inferior turbinectomy

c. Submucous resection of turbinate

d. Powered inferior turbinoplasty

Non resection procedures:

a. Outfracturing of turbinate

b. Chemical cauterization of turbinate

c. Cryotherapy

d. Surface and submucosal electrocautery

e. Radio frequency abalation

f. Coblation assisted turbinoplasty

g. LASER assisted turbinoplasty

Of which my study is about microdebrider assisted turbinoplasty – its adjuvant benefits when used along with routine septal correction procedures.

REVIEW OF LITERATURE

DESCRIPTIVE ANATOMY OF NOSE

1. LATERAL NASAL WALL

2. NASAL SEPTUM

LATERAL NASAL WALL

There are eight bones which form the lateral wall of nose

1. Maxilla

2. Ethmoid

3. Frontal

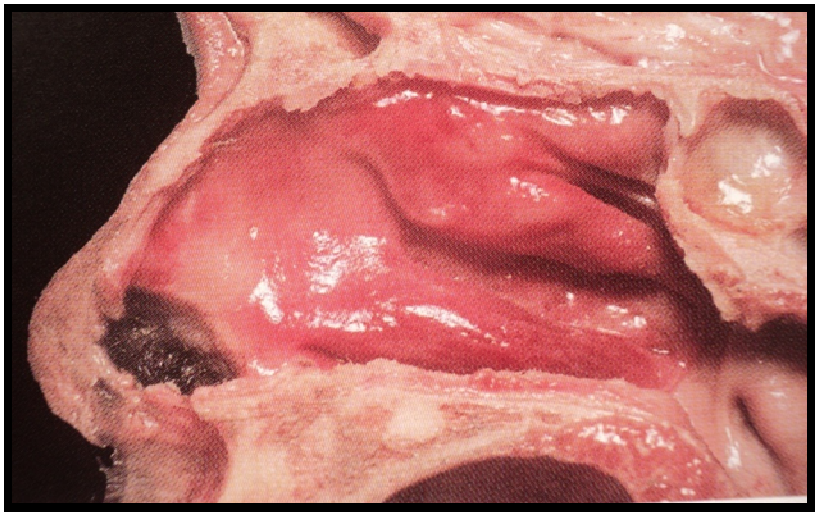
4. Sphenoid

5. Inferior turbinate

6. Lacrimal bone

7. Palatine bone

8. Nasal bone



Maxilla

It contains 5 processes

1. Alveolar process to which the roots of 2nd premolar and first 2 molars attach

2. Palatine process – to which the inferior turbinate attaches

3. Zygomatic process – which maintains the facial contour and gives attachment to various muscles and ligaments

4. Frontal process - which forms one of the boundaries for frontal recess

5. Floor of the orbit

The ethmoid bone:

It consists of four parts

1. Perpendicular plate – which forms a part of the bony nasal septum
2. Crista galli
3. Ethmoidal labyrinth forming the ethmoidal air cells
4. Cribriform plate – which forms the superior limit of the nasal cavity

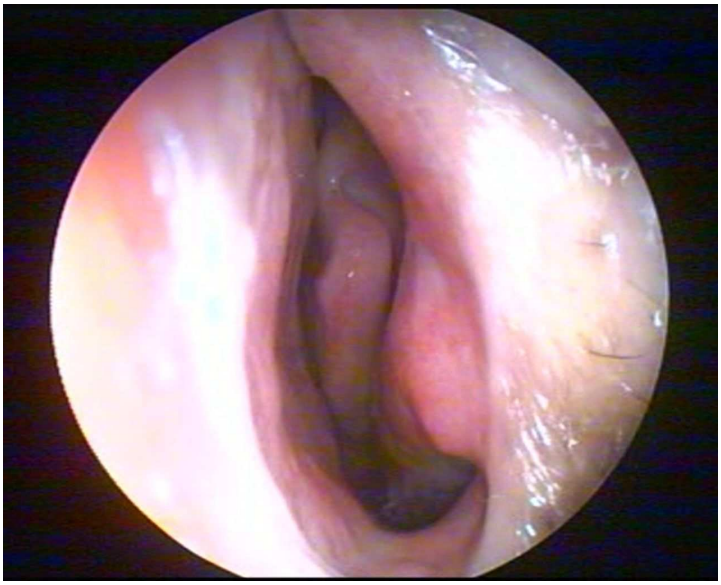
The Frontal bone:

Forms the anterosuperior boundary of the nasal cavity

The Sphenoid bone:

Consists of body, lesser wing, two greater wings and two pterigoid process. The body of sphenoid forms the posterosuperior boundary of nasal cavity. The pterigoid process forms the postroinferolateral wall of nasal cavity

Inferior turbinate:



The inferior turbinate bone has a maxillary process through which it attaches to inferior wall of maxillary hiatus and also forms the medial wall of inferior meatus.

Through the lacrimal process it articulates with the descending process of the lacrimal bone thus forming the bony boundary for the nasolacrimal duct

The ethmoid process of inferior turbinate arises a little behind the lacrimal process and it gets attached to the horizontal part of the uncinate process of ethmoid bone. Thus the uncinate process is attached to the lacrimal bone anteriorly and to the inferior turbinate posteroinferiorly

Thus the ethmoid maxillary and lacrimal process forms the medial boundary of nasolacrimal duct and the latter opens into the inferior meatus guarded by the valve of hassener.

The inferior turbinate has an extensive network of submucosal cavernous plexus with large sinusoids which are under autonomic control and they offer a major contribution to nasal resistance.

The Lacrimal bone

The lacrimal bone is a small bone forming the lateral nasal wall which attaches to the uncinate posteriorly , frontal process of maxilla anteriorly, and inferior turbinate inferiorly. It forms the medial boundary for the lacrimal sac and common canaliculus.

The Palatine bone:

The palatine bone is a biconcave bone which forms the floor of the nasal cavity separating the nasal from the oral cavity. Its horizontal process forms the inferior boundary for the posterior $2/3^{rd}$ of the nasal cavity. The anterior $1/3^{rd}$ is formed by palatine process of maxilla.

The Nasal bone:

The nasal bones are two in number and are wedge shaped, convex on the outer surface and concave on inner surface. The two nasal

bones unite in midline and are supported by nasal spine of frontal bone superiorly and by perpendicular plate of ethmoid posteriorly. Laterally it gets its attachment from the frontal process of maxilla thus forming one of the boundaries of external nose.

Nasal valve:

There are two nasal valves

1. External nasal valve
2. Internal nasal valve

External nasal valve:

Formed by

1. Membranous nasal septum
2. Sill of nose
3. Alae of nose
4. Lower lateral alar cartilages

Internal nasal valve:

Formed by

1. Cartilaginous nasal septum
2. Anterior end of inferior turbinate
3. Upper lateral alar cartilages

The internal nasal valve is approximately 1 cm from the external nares and it accounts for more than 50% of airway resistance, the inferior turbinate is the most important structure which influences this resistance.

Histology:

The inferior turbinate has three layers

1. Lateral thick mucosa
2. Medial thin mucosa
3. Intermediate bone

Mucosa:

The mucosa of inferior turbinate is lined by pseudostratified ciliated columnar epithelium. The mucosa consists of arteries, veins and venous sinusoids which forms a complex array. The mucosa also consists

of secreting goblet cells which produce glycoproteins, lysozymes, salts and polysaccharides. The inferior turbinate is densely distributed with goblet cells.

NERVE SUPPLY OF LATERAL NASAL WALL

1. Olfactory nerves :

They perform the special function like carrying the sense of smell from the olfactory region of nasal cavity. The olfactory region is defined as the part of the nasal cavity above the horizontal line drawn along the superior turbinate.

2. Nerves of common sensation :

They are

1. Anterior ethmoidal branch of ophthalmic division of trigeminal nerve
2. Infraorbital branch of maxillary division of trigeminal nerve
3. Branches from sphenopalatine ganglion

The anterior ethmoidal nerve supplies the anterior 1/3rd of the nasal cavity. The branches from the infraorbital nerve supplies the nasal vestibule both medially and laterally. Most of posterior 2/3rd of nasal cavity is supplied by branches from sphenopalatine ganglion. And this ganglion can be anaesthetized by keeping topical local anaesthetics over the sphenopalatine region which is represented by the area of the lateral nasal wall posterior to posterior end of middle turbinate.

Autonomic nerves:

Parasympathetic nerve supply arises from the greater superficial petrosal nerve which travels in vidian nerve (nerve of pterigoid canal) and reaches the sphenopalatine ganglion and relays into the nasal cavity. They supply the mucosa and blood vessels of nasal cavity and aids in vasodilatation.

The sympathetic nerve fibres arise from the upper two thoracic spinal cord segments , pass through the superior cervical ganglion and by travelling through the deep petrosal nerve they join greater petrosal nerve's parasympathetic fibres to form vidian nerve (nerve of pterigoid canal) . They bypass the sphenopalatine ganglion and supply the nasal cavity. The sympathetic stimulation produces vasoconstriction and decreased secretions. Excessive rhinorrhoea as in

vasomotor rhinitis and allergic rhinitis can be controlled by resection of the vidian nerve.

Blood supply

1. The lateral nasal wall receives its blood supply from the anterior and posterior ethmoidal arteries which are branches of ophthalmic artery which inturn arise from the internal carotid artery system

2. The posterior nasal branches arising from the sphenopalatine artery , the greater palatine artery arising from internal maxillary artery, branches of facial artery to the vestibule of nose , anterior superior dental from the internal maxillary artery all these contribute to the external carotid artery system

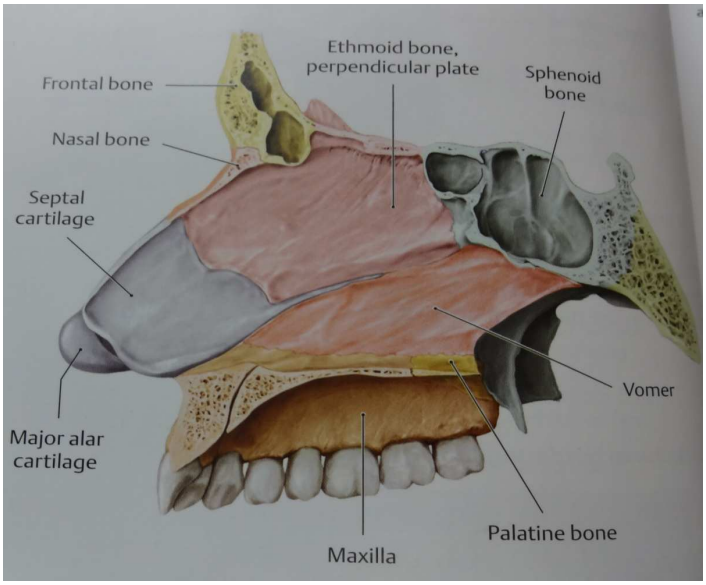
Lymphatic drainage:

Lymphatics from anterior nasal cavity and external nose drain into submandibular lymphnodes. The upper deep cervical nodes drain the rest of the nasal cavity either through retropharyngeal nodes or directly. There is a communication between the subarachnoid space and upper part of nasal cavity through the olfactory nerves

NASAL SEPTUM

The nasal septum is composed of

1. Small membranous septum
2. Cartilaginous septum
3. Bony septum



The membranous septum is formed by the skin of the columella and medial crus of the alar cartilage and contributes very little to the nasal septum but helps in maintaining the contour of the tip of nose

The cartilaginous portion of the nasal septum is formed by quadrilateral cartilage which forms the major portion of the cartilaginous

nasal septum. Medial edge of upper and lower lateral alar cartilages have some minor contribution

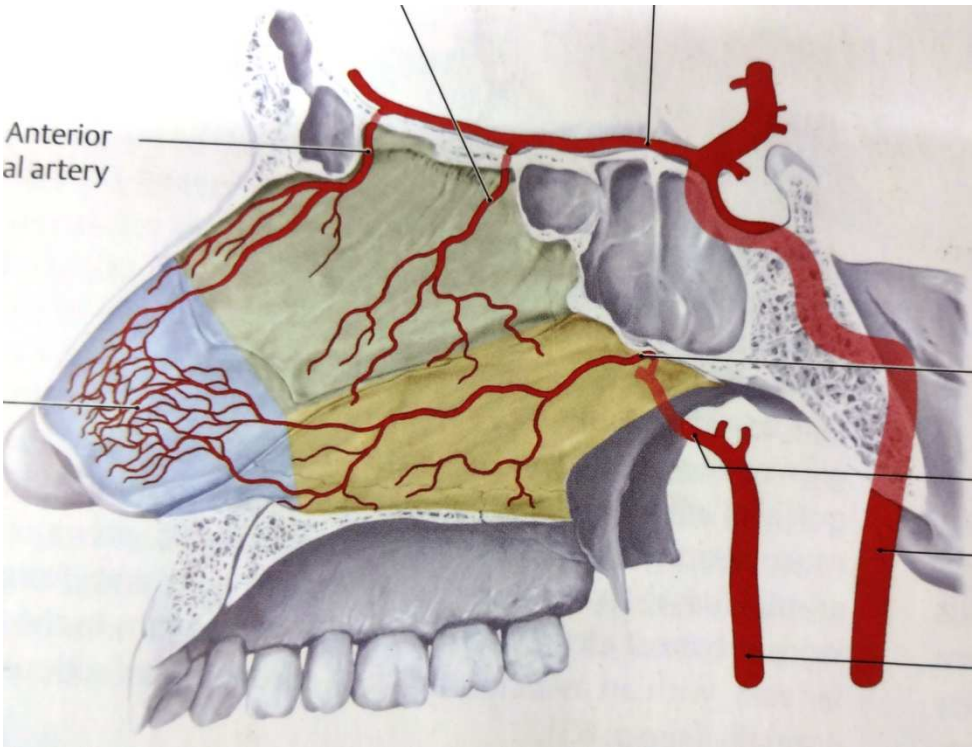
The bony nasal septum is contributed by minor bony processes like nasal spine of frontal bone, rostrum of sphenoid, crest of maxilla and crest of palatine bone and major contribution comes from perpendicular plate of ethmoid and vomerine bone. The perpendicular plate of ethmoid forms the superior and anterior bony septum and is continuous above with the cribriform plate of ethmoid and crista galli. The vomer forms the postero inferior part of the bony nasal septum and it articulates by its two alae with the rostrum of sphenoid. Inferiorly the vomer articulates with the maxillary crest and crest of palatine bone. The quadrangular cartilage is of crucial importance in the development of middle third of face.

Deflections may be formed at any part of the septal articulations and spurs may be found where quadrilateral cartilages send small processes between ethmoid and vomer. **Theile** found out that the septal deflecitons are more commonly to the left then to the right. And septal deviations are more common in men than in women and are most likely acquired by trauma rather than congenital and it has been found out that the septal deflections vary even between identical twins which

substantiates the statement that the septal deviations are produced by trauma.

The nasal septal framework is covered by a layer of periosteum and perichondrium which provides nutrition to the underlying nasal septum which inturn is covered by nasal mucosa.

BLOOD SUPPLY OF NASAL SEPTUM



1. The posterior septal branch of sphenopalatine artery which inturn is a branch of internal maxillary artery supplies the posteroinferior part of the nasal septum

2. The greater palatine artery, another branch of sphenopalatine artery supplies the anteroinferior part of the nasal septum entering the nasal cavity via the incisive canal.

3. The superior labial branch of facial artery supplies the anterior aspect of nasal septum. All the above mentioned branches are from the external carotid system.

4. The anterior ethmoid and posterior ethmoid branches belonging to the internal carotid artery system supply the anterosuperior and posterosuperior part of the nasal septum respectively

There kiesselbach's plexus is formed by the anastamosis of anterior ethmoid, superior labial and greater palatine branches and the area over the nasal septum representing this anastamosis is called little's area which is present in the anterior end of nasal septum. This area is more prone for epistaxis as both the internal and external carotid systems meet.

There is also sinusoidal system in the submucosa of the nasal septum mostly in the anterior part which is under the autonomic control similar to the one present in the inferior turbinates. This sinusoid regulates the airflow to the olfactory cleft. This intumescence is first described by **Morgagni.**

The cavernous system drains via the sphenopalatine vessels into the facial veins anteriorly and pterigoid plexus posteriorly. The ethmoidal veins communicate with the superior ophthalmic system extending intracranially through the foramen caecum into the superior saggital sinus

NERVE SUPPLY:

The sensory supply to majority of the nasal septum is from the maxillary division of trigeminal nerve.

The nasopalatine nerve entering the nasal cavity via the sphenopalatine foramen passes along the roof of the nasal septum towards the incisive canal supplying the bulk of the bony nasal septum.

The anterior ethmoidal branch of nasociliary nerve supplies the anterosuperior part of the nasal septum. The anterosuperior alveolar nerve supplies the smaller anteroinferior part of nasal septum.

The posteroinferior nasal branch of anterior palatine nerve and the nerve to pterigoid canal supply the posteroinferior part of nasal septum

Parasympathetic nerve supply arises from the greater superficial petrosal nerve which travel in vidian nerve (nerve of pterigoid canal) and

reaches the sphenopalatine ganglion and supply the vessels of the nasal septum similar to that of the lateral nasal wall.

The sympathetic fibres from the upper two thoracic spinal cord segments pass through the deep petrosal nerve and join the greater petrosal nerve to form the vidian nerve which bypasses the sphenopalatine ganglion to supply the nasal septum.

PHYSIOLOGY OF NOSE AND NASAL CAVITY

The nose contains organs for smell and respiration. It cleans, warms and humidifies the inspired air and cools and removes water from expired air. It adds quality to speech production.

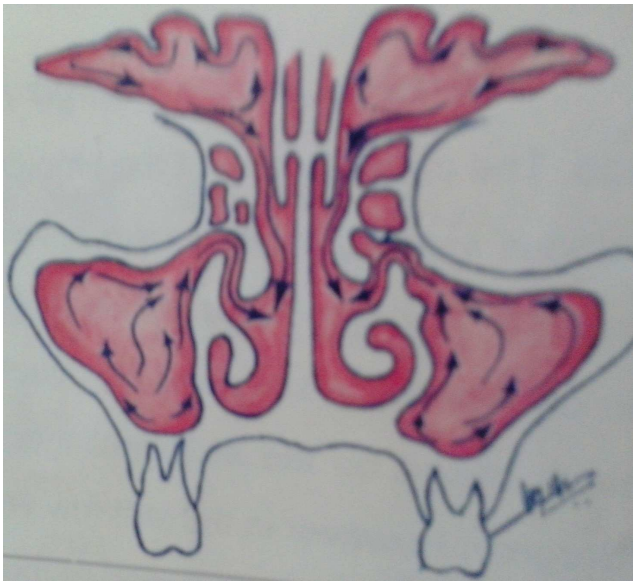
The following functions are performed by the nose:

1. Airway
2. Heat exchange
3. Humidification
4. Filtration
5. Nasal resistance
6. Voice modification
7. Olfaction

The nose acts as an air conditioning unit. It performs heat transfer, humidification and filtration. All these functions are bypassed during exercise. During respiration air stream enters the nasal cavity in a oblique vertical direction. Aerodynamically the airflow is laminar which means there is no mixing of different layers of air flowing till it reaches

the nose. Then it passes through the narrowest part of the upper respiratory tract, the limen nasi and further passes through a relatively wider nasal cavity where because of diffuser effect, most of the laminar flow of air transforms into turbulent flow where different air layers mix with each other. The specialized anatomy of the nasal cavity is responsible for such a degree of change in airflow. The septal deviations with or without cartilage and bony spurs , turbinate hyperplasia or septal perforation play a very significant role in this issue. The transition from laminar to turbulent flow in the nasal cavity is desirable because this prolongs its contact with the nasal mucosa, contributing to olfaction and for cleaning and humidification of inspired air

NASAL CYCLE:



It is a physiological phenomenon exhibited by the nasal cavity by an alteration between luminal narrowing and widening of nasal cavites. This is mainly affected by reaction of venous capacitance vessels of middle and inferior turbinates and is regulated by autonomic nervous system.

AIRWAY

The nose provides a semi rigid passageway for in- and outgoing air. On entering the nose, the air is directed upward by the nares . The air stream turns 80 to 90 degrees posteriorly as it reaches the nasal vault to traverse a mostly horizontal path until it impacts against the posterior wall of the nasopharynx. At this point, joined by the air stream from the other side, an 80- to 90-degree downward bend occurs. Each of these two bends, termed

"Impaction points," likely facilitates the removal of particulates contained in the incoming air. Impaction against the adenoid may enable the adenoid to respond immunologically by "sampling" the contaminants contained in the air. "Sniffing" draws the inspired air higher in the nasal cavities to reach the olfactory areas. The expiratory route is generally the reverse of the inspiratory and also may reach the olfactory area

AIR STREAM

The anterior nasal valve, or ostium internum, is located at the limen nasi, some 1.5 to 2 cm posterior to the nares. At this point, the cross section of the airway is 20 to 40 mm^2 on each side, is the narrowest part of the upper respiratory tract, and provides about 50% of the total airway resistance. Posterior to this in the horizontal section of the nasal airway, the cross-section widens while the air stream remains narrow and thus provides

a large surface area in intimate contact with the air stream. Evidence has accumulated that there is a 2 to 4-hour cyclic alteration of nasal resistance from one side to the other. A prolonged increase in nasal resistance can lead to cor pulmonale, cardiomegaly, and pulmonary edema. The most common sequel to increased nasal resistance is mouth breathing, thus bypassing the air conditioning and cleansing functions of the nose.

AIR SPEED

The air speed is greatest at the anterior nasal valve, reaching 3.3 m/s at an inspiratory flow rate of 200 mL/s compared with 1 m/sec in secondary bronchi . Beyond the valve, the air speed slows down, thus

enabling a longer contact between the incoming air and the nasal walls. At the choana, the stream again narrows

HEAT EXCHANGE AND HUMIDIFICAITON

It is necessary that the inspired air is humidified and warmed by the nose before reaching lower airways. Humidification of the inspired air is accomplished by the transudation and secretion of nasal glands, epithelial goblet cells and vessels of lamina propria.

Temperature regulation is controlled by intranasal vascular system especially in the venous erectile tissue which are abundant in inferior turbinates.the temperature in the anterior part of the nasal cavity is lower than in the posterior regions. This temperature variation produces gradual warming of the inspired air. On expiration the heat and moisture are returned to the nose through condensation. Thus the temperature of the inspired air is increased upto 25 degrees and humidity increased by 90%.

Disturbances of such functions of nose occur in age related drying of mucosa and involution of glands and goblet cells and also from chronic inflammations of nose and extensive surgical resection of mucosa during intranasal surgery.

PROTECTIVE FUNCTIONS

MECHANICAL DEFENCES:

The most important first line of defence of the nasal cavity is the mucociliary apparatus. The mucociliary transport mechanism consists of the cilia from the respiratory epithelium, a mucous blanket which consists of a deep less viscid sol layer where the cilia beats and a superficial more viscid gel layer where the unwanted particles are embedded.

Any disturbance in mucociliary transport may be due to increased viscosity and thickness of sol layer, changes in elasticity of gel layer resulting in ineffective mucous transport caused by various etiologies such as acute viral infection wherein there is desquamation of epithelium and loss of ciliated cells, ciliary dyskinesia syndromes where there is morphological changes of cilia such as absence of dynein arms leading to dyskinetic, uncoordinated ciliary movements that prevent effective mucus transport.

NON SPECIFIC PROTECTIVE FACTORS:

Since the nasal cavity is directly exposed to the atmosphere the nasal mucosa synthesizes protective factors like interferons, proteases,

protease inhibitors, lysozymes and antioxidants which reduce the pathological nature of the particles inhaled. The nasal mucosa also has rich accumulation of neutrophils, lymohocytes, monocytes and NK cells which protect mainly against viral infections.

SPECIFIC IMMUNE RESPONSES:

Nasal mucosa also acts as a lymphoepithelial tissue apart from the waldeyer's ring. The structures of the waldeyer's ring such as pharyngeal and palatine tonsils act as inductive components which process and present the antigens whereas the nasal mucosa itself acts as an effector organ where the phagocytosis of the foreign materials is done by immunocompetent cells.

Antibodies are formed in the paraglandular plasma cells. IgA is the most important immunoglobulin which is present along the mucosal lining of intestinal as well as respiratory epithelial cells. The plasma cells of the nasal mucosa also secrete IgM and IgG. These immunoglobulins are responsible for the humoral immune response of the nasal mucosa.

The mast cells, polymorphonuclear leucocytes like neutrophils, basophils , eosinophils, macrophages, lymphocytes and cells of reticulo endothelial system are responsible for the cellular immune response of the nasal mucosa. The T lymphocytes are responsible for

maintaining memory functions of immune response while the B lymphocytes differentiate into plasma cells and hence play a key role in humoral immune response. Eosinophilic granulocytes are found in association with nasal polyps and chronic sinusitis. Basophilic granulocytes and mast cells are involved in immediate allergic reactions and they have a specific binding site for IgE. When on contact with corresponding allergens they initiate a devastating allergic reaction which may lead to anaphylactic shock.

Epithelial cells of nasal mucosa express adhesion molecule ICAM-1 which acts as a receptor for more than 90% of rhinovirus thus preventing viral infections.

The endothelial cells of the blood vessels present in the nasal mucosa have some specific immune response. The vascular endothelial cells are activated by inflammatory mediators like interleukin-1, tumour necrosis factor – alpha which produce trans endothelial diapedesis of various immunocompetant cells by expression of various adhesion molecules and thus producing destruction of pathogens.

SPEECH PRODUCTION:

The supraglottic tract which includes nose , paranasal sinus, nasopharynx refer to the rigid air containing regions above the level of

the vocal cord and their condition is subject to only minor variation under physiological conditions. The hyponasal speech or rhinolalia clausa is caused when the supraglottic vocal tract contributes less to the sound production as in partial or complete obstruction or mass lesion of the nasopharynx or nasal cavity. On contrary the hypernasal voice or rhinolalia aperta occurs when the nasopharynx or the nasal cavity over contributes to the voice production as in cleft palate, velopharyngeal insufficiency.

OLFACTION:

The intranasal olfactory epithelium and associated central pathways are more in number in nasal mucosa. The sensory cells consists of bipolar receptor cells whose proximal processes join to form fila olfactoria which are relayed through additional neurons and are distributed to primary , secondary and tertiary olfactory centres. The olfactory impression can be received only during inspiration and only water soluble and lipid soluble substances can be perceived. Even a very small difference in chemical properties of a molecule can produce a clearly perceptible difference in quality and quantity of olfactory impression. It is mandatory to differentiate between olfactory disturbances and taste disorders as the sense of smell and taste are closely

interrelated. Patients often have the sense that they have a dysfunction of both the senses but the olfactory disturbance is the sole cause for more than 2/3rd of cases.

HISTOLOGY OF RESPIRATORY MUCOSA:

The pseudostratified respiratory mucosa consists of ciliated, intermediate, basal, and goblet cells. They rest on a well-defined basement membrane supported by a relatively deep, loose lamina propria containing small blood vessels, venous plexuses, ducts of mucous and serous glands, sensory nerves, and blood cells (primarily lymphocytes). The blood capillaries and the venules are thin walled and possess a fenestrated endothelial lining and a porous basement membrane.

The tall (15 to 20 microns) columnar ciliated cell is the predominant cell and extends from the basement membrane to the luminal surface, where cilia admixed with microvilli are present. The microvilli are shorter than the cilia and some are branched. The microvilli contain bundles of microfilaments and display hairlike projections. The function of the microvilli is unknown, although it is clear that they greatly increase the cell surface area. The ciliated cell cytoplasm forms complex interdigitations with adjacent cell membranes, presumably to permit intercellular exchange.

Irregular intercellular spaces exist to accommodate edema fluid and inflammatory cells for implementation of immune response.

Basal cells lie on the basement membrane and likely are progenitors of columnar and goblet cells. Evidence suggests that the primary progenitor may be a nonciliated columnar cell that can form a ciliated cell. Goblet cells taper upward from the basement membrane to an expanded body at the lumen, where microvilli are found on their exposed surfaces. The nucleus is situated basally, and secretory granules that contain mucin are seen toward the lumen. Columnar cells extend from a narrow base at the basement membrane to an expanded surface area covered by microvilli. These cells are related to adjacent cells by tight junctions apically and by interdigitations of the cell membrane. This cell may be the progenitor of airway epithelium.

AIMS AND OBJECTIVES OF THE STUDY

To compare the outcome of septoplasty and septoplasty combined with inferior turbinoplasty by

a. Comparing the symptomatic improvement

b. Comparing the preop and postop DNE findings

c. Comparing the postoperative incidence of complications

MATERIALS

STUDY PLACE: Rajiv Gandhi government general hospital,

Chennai – 6000003

COLLABORATING DEPARTMENT: Upgraded Institute of OtoRhinoLaryngology

STUDY DESIGN: Prospective

STUDY PERIOD: NOVEMBER 2012 TO OCTOBER 2013

ETHICAL CLEARANCE: Obtained

INCLUSON CRITERIA:

1. Age 20 to 45 years of age both sexes

2. Patients with deviated nasal septum with inferior turbinate hypertrophy

3. No evidence of allergy, vasomotor rhinitis or related symptomatology

EXCLUSION CRITERIA:

1. Patients above the age of 45 and those below the age of 20

2. Patients with associated allergic reactions or other symptomatology

3. Patients with co-morbid illness (eg. Diabetes, coronary artery disease)

INVESTIGATION:

1. Diagnostic nasal endoscopy

2. CT paranasal sinuses

3. Preop and post op questionnaire

4. Routine laboratory investigations (complete blood counts, renal function tests, etc.,)

DATA COLLECTION: Clinical

BENEFIT TO THE COMMUNITY:

1. Awareness of various surgical techniques

2. Awareness of advantages and disadvantages of the technique preferred

3. Awareness of incidence of complication

4. Awareness of post operative improvements in symptoms

CONFLICT OF INTEREST: NIL

FINANCIAL SUPPORT: NIL

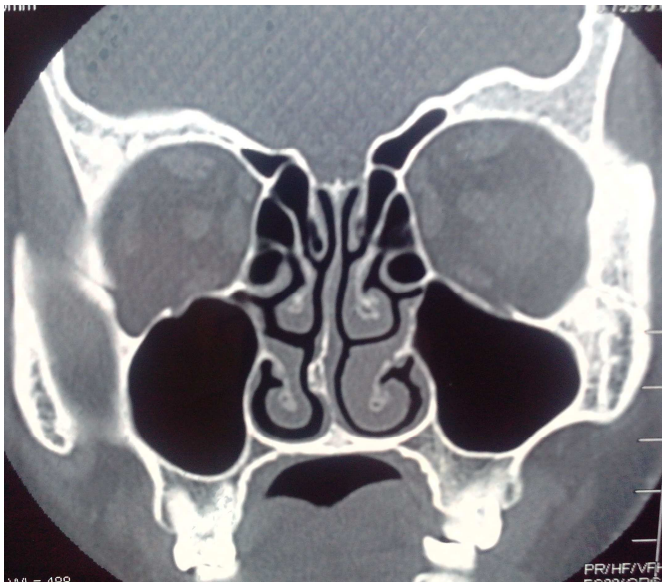
PRINCIPLE INVESTIGATOR: Dr. VIJAY PRADAP.R

MS ENT POST GRADUATE

METHODOLOGY

The study was conducted in Upgraded Institute of OtoRhinoLaryngology in the tertiary care Rajiv Gandhi Government General Hospital and Madras Medical College.

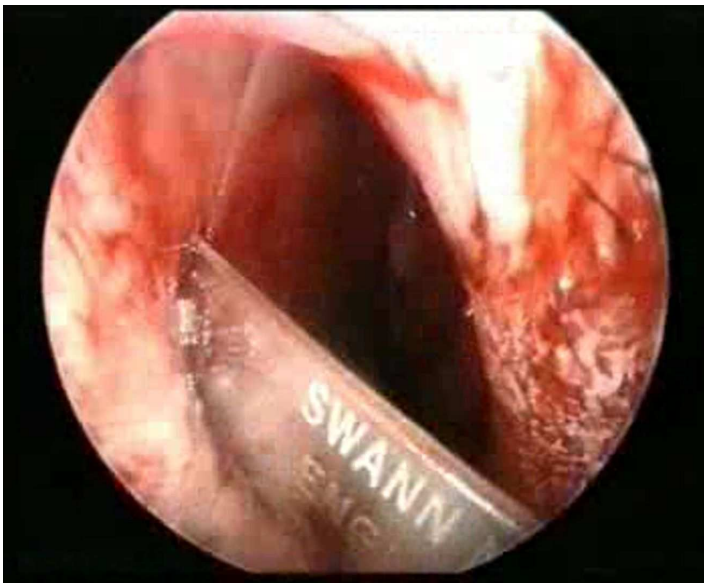
The patients who presented with deviated nasal septum and inferior turbinate hypertrophy both clinically and by CTPNS were taken into study after matching them with the inclusion criteria.



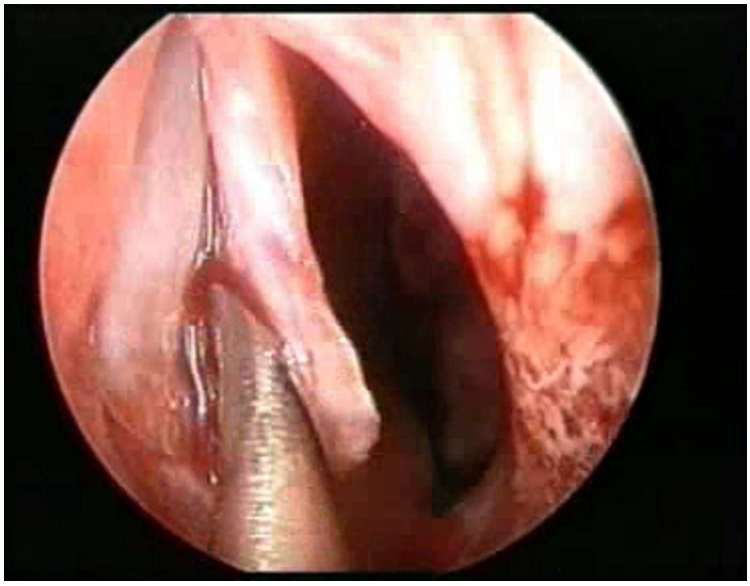
It was primarily a double blinded prospective randomised control study where all patients in the even number were taken for septoplasty with inferior turbinoplasty and all patients with odd number were chosen for septoplasty alone.

The anaesthesia preferred was either a local or general anaesthesia. In local anaesthesia, the local anaesthetic chosen was 2% lignocaine with 1:100000 adrenaline solution approx. 3-5 ml is injected into the submucoperichondrial layer of the nasal septum and the submucosa of both inferior turbinates each. The cotton patties soaked in 4%lignocaine with adrenaline were used for topical decongestion and surface anaesthesia of nasal mucosa. In general anaesthesia 1:100000 adrenaline solution is used for injecton to reduce intraoperative blood loss. And adrenaline at concentrations of 1:10000 is used for surface decongestion.

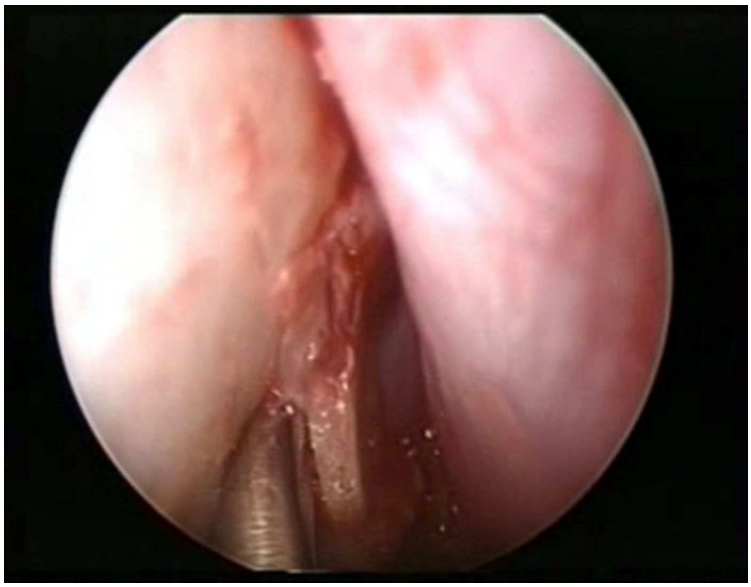
Using a zero degree Hopkins rod lens endoscope, after infiltration without applying decongesting cotton patties, septoplasty done by making a Freer's incision on the nasal septum on the side where there is caudal dislocation of nasal septum.



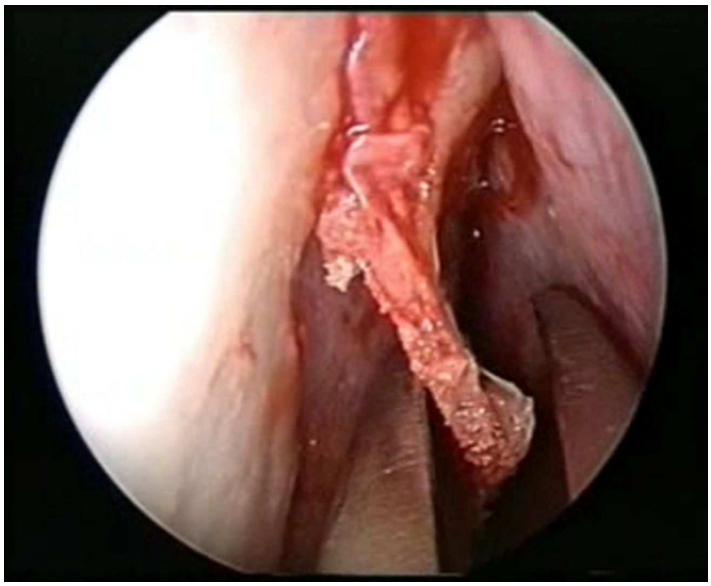
Mucperichondrial and mucoperiosteal flaps are elevated on the same side.



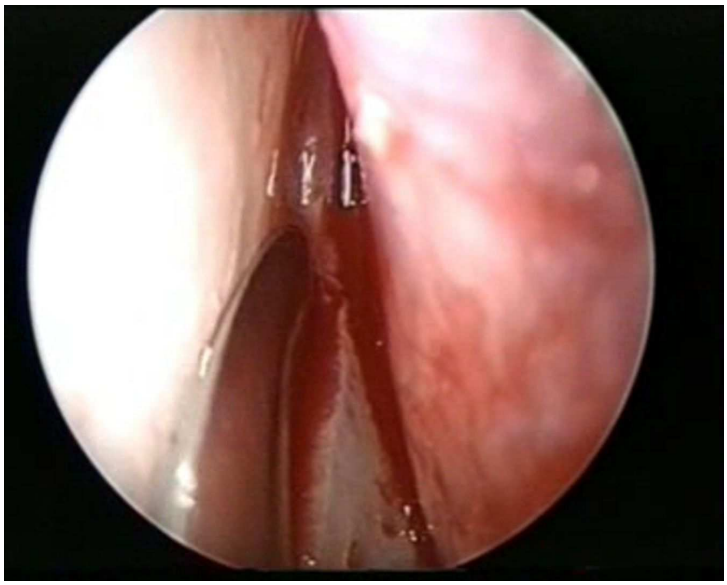
Bony cartilaginous junction of the nasal septum disrupted and opposite side mucoperiosteum elevated.



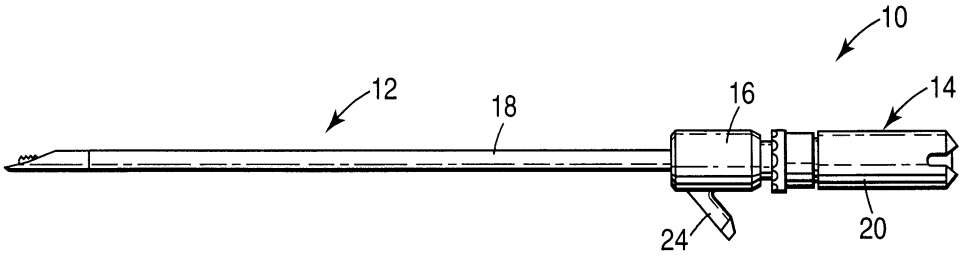
The deviated bony nasal septum with septal spur is removed.



The septal cartilage dislocated from its inferior attachment and a 5 mm strip of cartilage is removed from the inferior part of the septal cartilage.

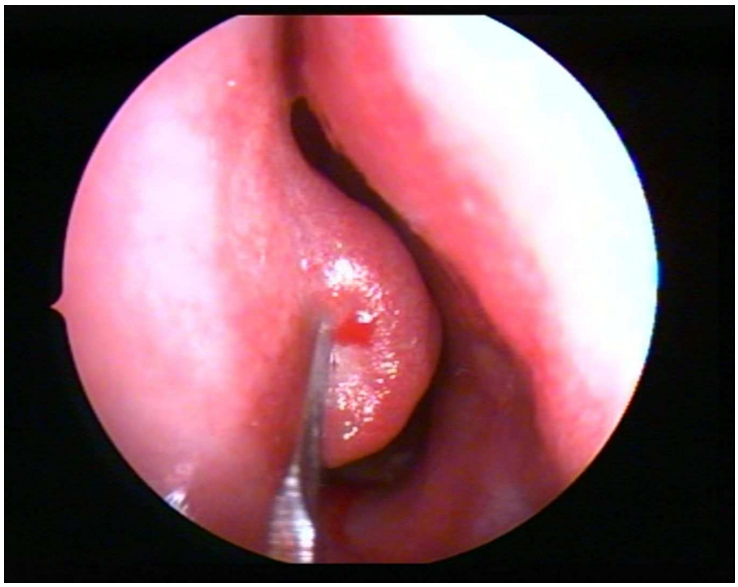


The anterior remnant of the septal cartilage is scored. Mucoperichondrial flaps sutured.

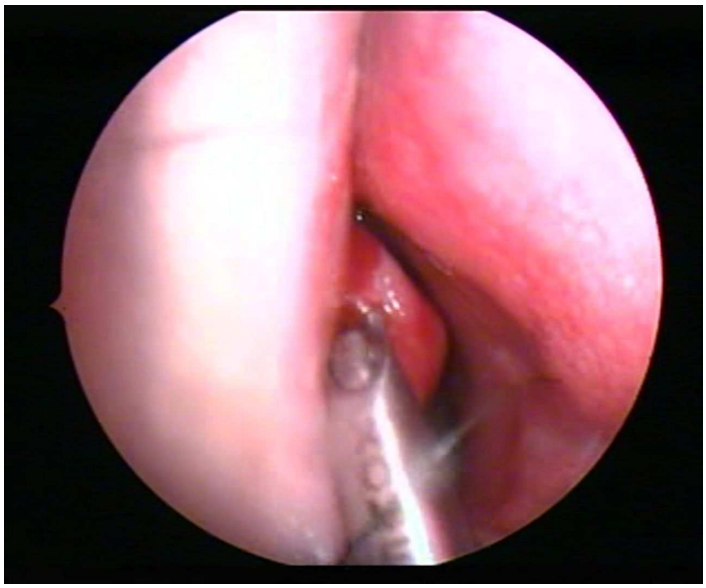


TURBINOPLASTY BLADE SIZE 2.9 MM

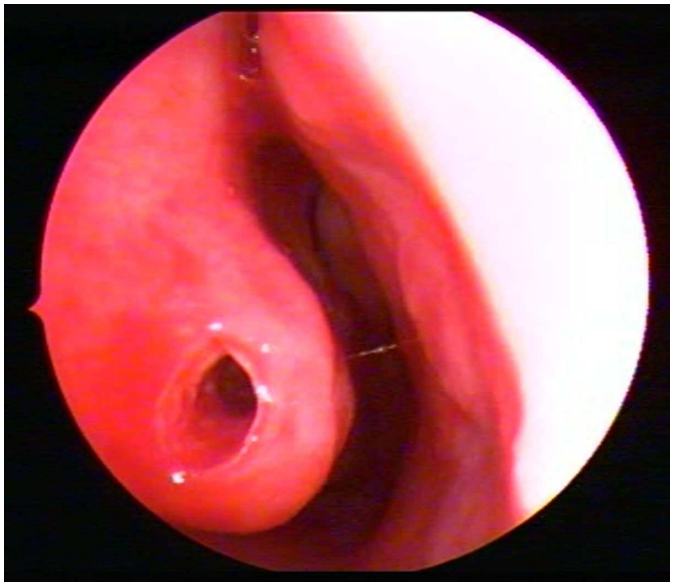
After infiltrating the inferior turbinate using Hopkins zero degree rod lens endoscope a 5mm vertical incision is made on the anterior end of the inferior turbinate.



A turbinoplasty blade size 2.9 is attached to a microdebrider is inserted through the incision and the submucosal soft tissue is debrided along the medial aspect of the inferior turbinate.



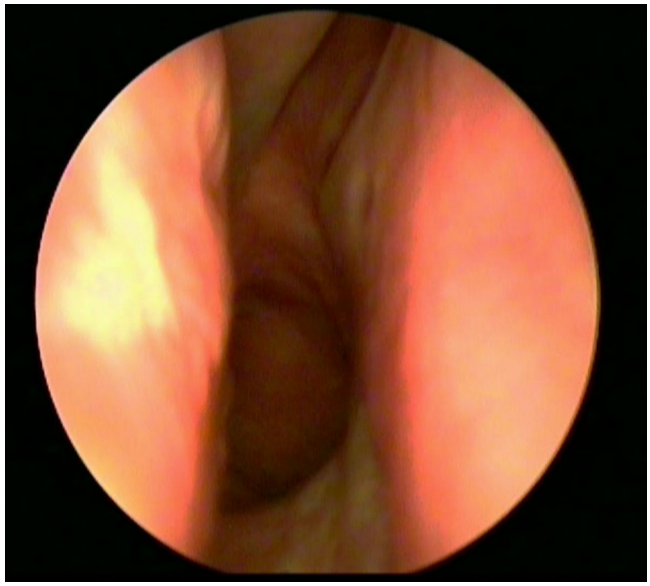
Submucosal tunneling is done along the medial aspect of the inferior turbinate



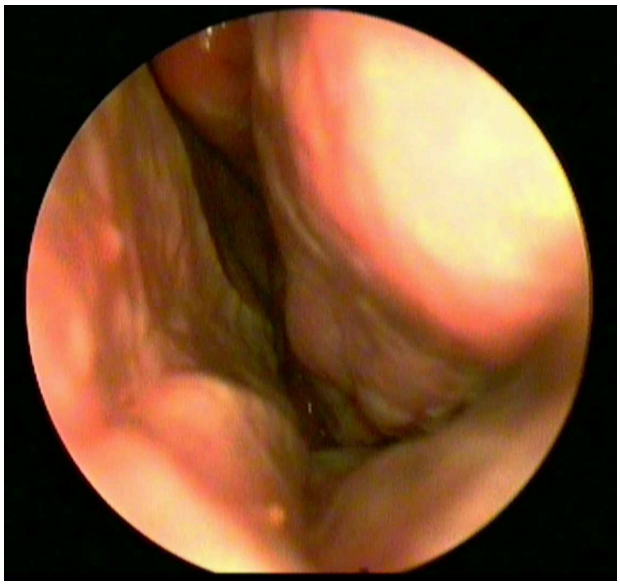
Cotton patties are placed for compression and hemostasis. Same procedure is repeated on the other side inferior turbinate. Nose packed with merocel or medicated gauze. The submucosal microdebrider assisted turbinoplasty is done on the side of inferior turbinate hypertrophy. Pack removal is done after 48 hours.

The patients were given a questionnaire which contains symptom scores and lifestyle improvement parameters (annexure 1) before the procedure and 6 months after the procedure and were asked to score their symptoms. This scoring system was taken from SNOT – 20 (sinonasal outcome test – 20) original research was published in journal of otorhinolaryngology, head and neck surgery(2007) done by **John Patrick Browne, PhD, et al** which consists of a series of 20 questionaires on the outcome of rhinological symptoms pre and postop. The original SNOT

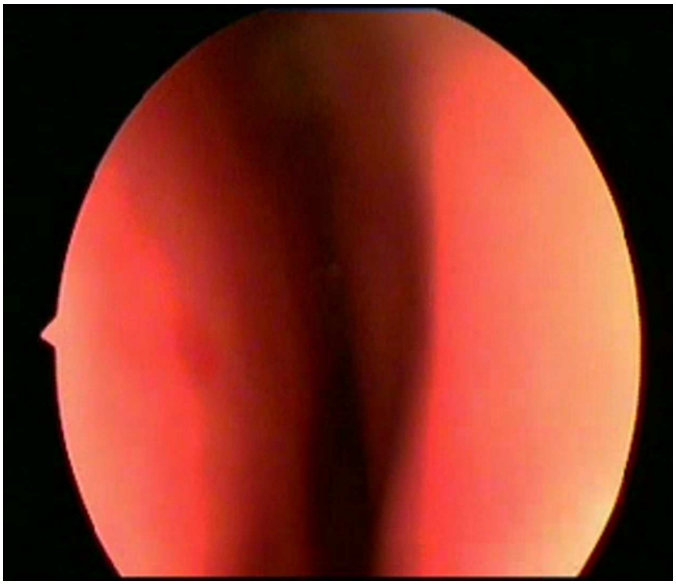
scoring system has been modified according to our needs selecting 5 relevant parameters like nasal obstruction, facial pain, difficulty in falling asleep, reduced concentration at work and irritability which can be clinically correlated with the study. This acts as a subjective analysis of the nasal symptoms.



Post op DNE right side showing adequate first pass



Post op DNE left side showing adequate first pass



Post op DNE on left side showing inadequate first pass

The preop and 6 months postop DNE was also recorded and the adequacy of the first pass using 0 degree 4 mm Hopkins rodlens endoscope was noted which can be used as an objective assessment of nasal airway. In an adequate first pass the scope can be passed till the choana easily without any decongestant with only 10% lignocaine spray for surface anaesthesia. In an inadequate first pass the scope is either cannot be passed or is to be negotiated with great difficulty to reach the choana without any decongestant.

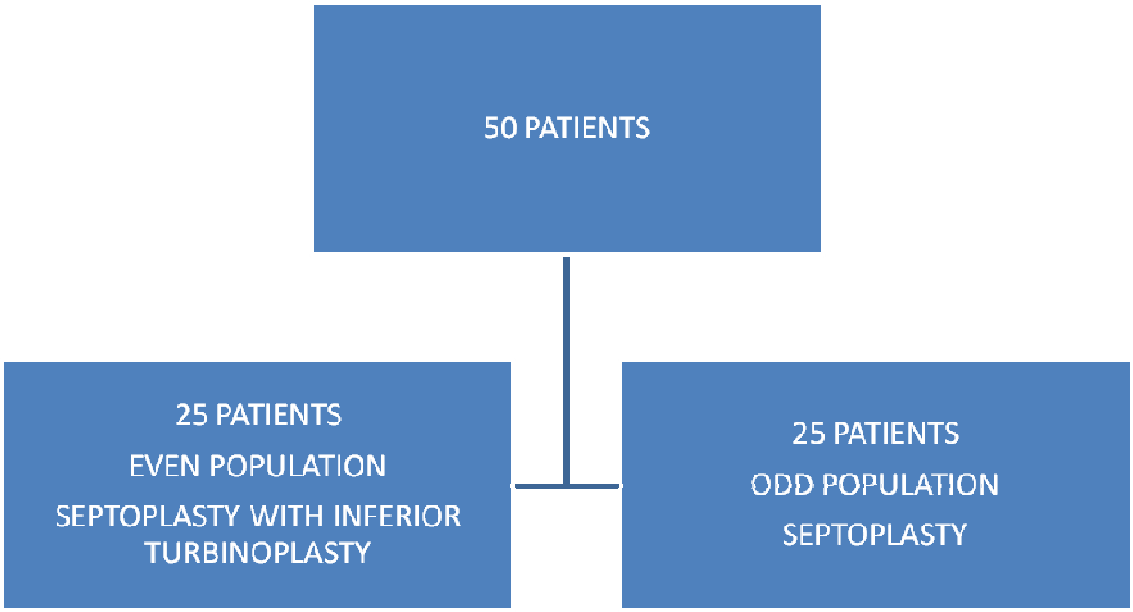
STATISTICAL ANALYSIS

The mean, median, mode and standard deviation were calculated for all continuous variables. Distribution of the variables was assessed by kolmogrov-smirnov tests. For continuous variables not normally distributed median and the mid-quartile range were calculated. Pearson's chi square was applied to categorical variables including age, sex, symptomatology, clinical findings, DNE findings. Fischer's Exact was applied wherever required. Chi square for trends was applied for ordinal data. A p value less than 0.05 was taken as significant. SPSS version16.0 was used for analysis.

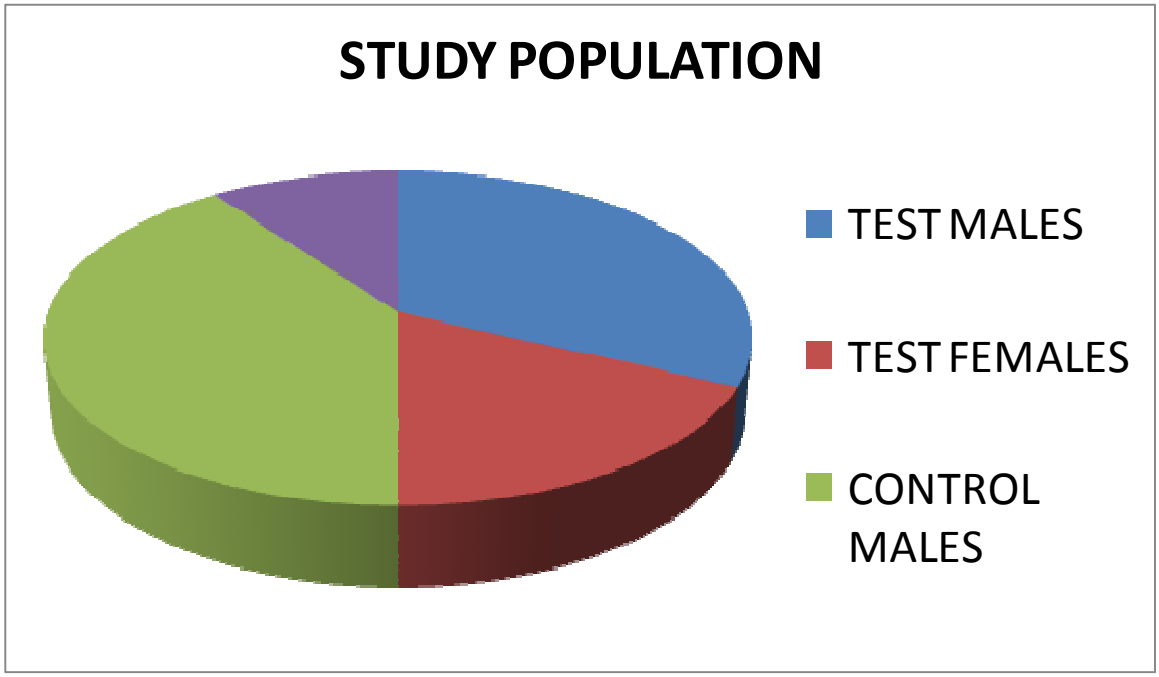
RESULTS

A total of 50 patients were enrolled in study, of which 25 patients undergone septoplasty alone were treated as control population wereas the other 25 patients who have undergone septoplasty with inferior turbinoplasty were treated as test population. Among the test population 12 patients have undergone b/l turbinoplasty,6 patients have undergone left turbinoplasty, 7 patients have undergone right turbinoplasty in combination with septoplasty. The groups were randomised as odd numbers in control group and even numbers in the test group. The outcome of the study is termed as a success if the symptomatic improvement and objective diagnostic nasal endoscopy is better for the test group than the control group at the end of 6 months.

FLOW DIAGRAM OF THE POPULATION ENROLLED:



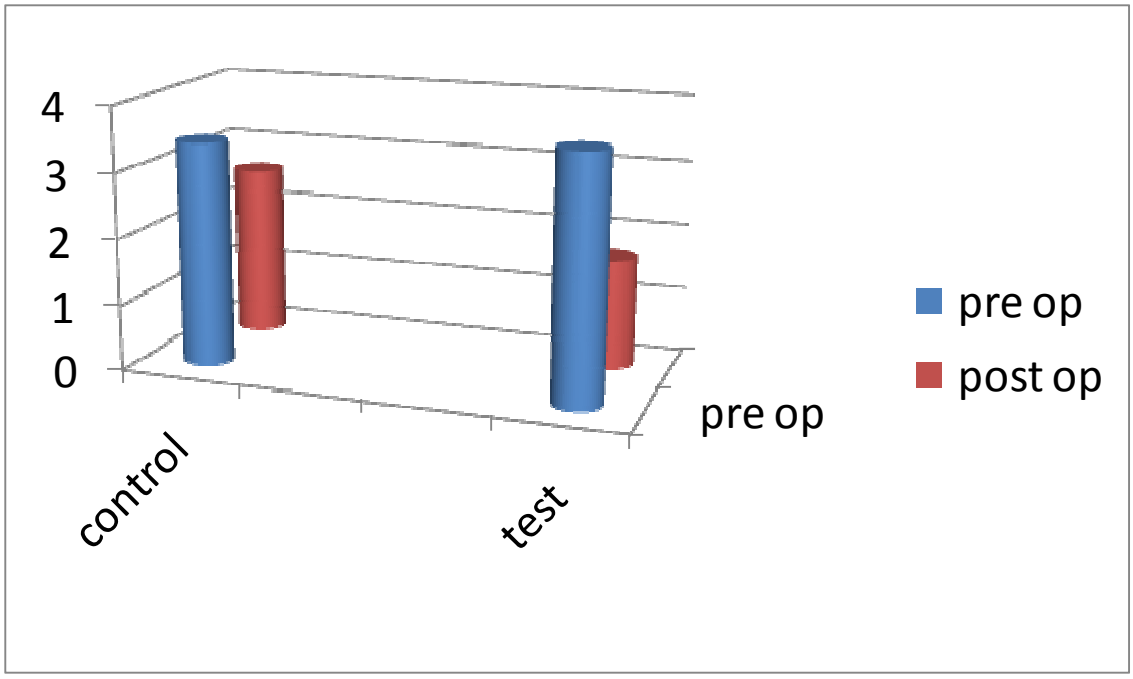
Pie chart showing the sex distribution in the study:



SEX * GROUP Crosstabulation

			GROUP		
			SEPTOPLASTY	SEPTOPLASTY WITH TUBINOPLASTY	Total
SEX	MALE	Count	20	16	36
		% within GROU	80.0%	64.0%	72.0%
	FEMALE	Count	5	9	14
		% within GROU	20.0%	36.0%	28.0%
Total		Count	25	25	50
		% within GROU	100.0%	100.0%	100.0%

In the above mentioned picture and table among the 25 control group 20 were males and were females. And among the 25 test group 16 were males and 9 were females.



The above mentioned diagram is plotted by comparing the symptomatic improvement among the control group who have undergone septoplasty alone and the test group who have undergone septoplasty with inferior turbinoplasty taking the parameter – **nasal obstruction** into account. We can notice the increased improvement in symptoms in the test group.

Group Statistics

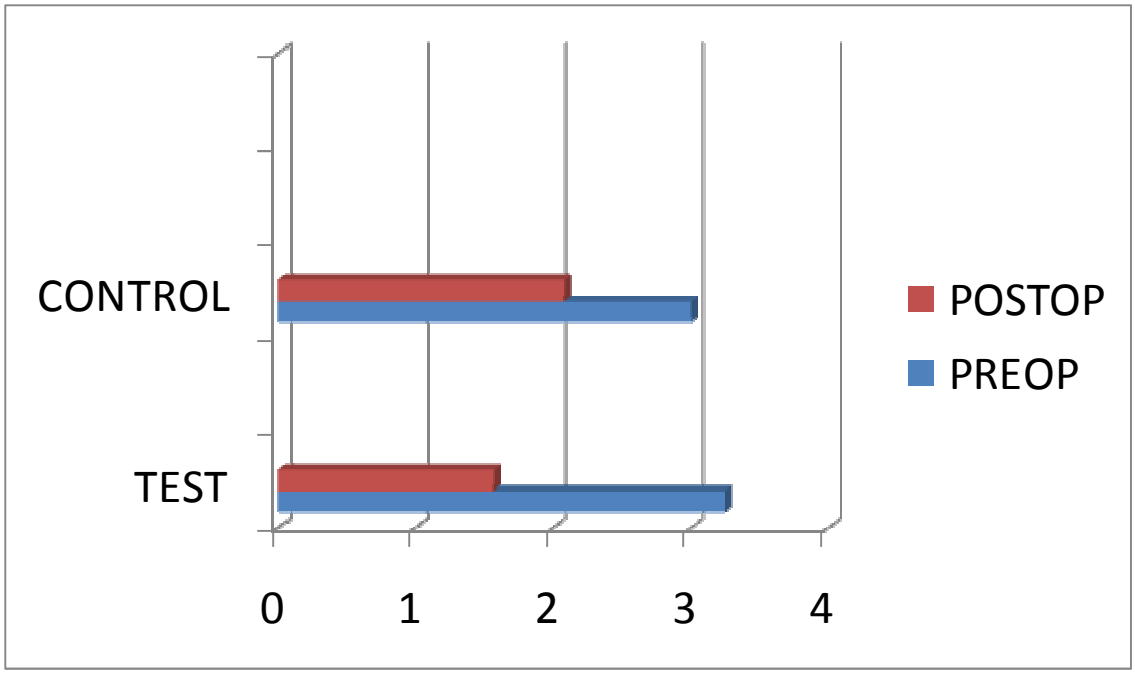
	GROUP	N	Mean	td. Deviatio	Std. Erro Mean
NASAL OBSTRI - PREOP	SEPTOPLASTY	25	3.40	.645	.129
	SEPTOPLASTY TUBINOPLAST	25	3.68	.476	.095
NASAL OBSTRI - POSTOP	SEPTOPLASTY	25	2.60	.500	.100
	SEPTOPLASTY TUBINOPLAST	25	1.68	.476	.095

In the above mentioned table the test group has a mean reduction in symptom score of 2.0 while the control group has a mean reduction in symptom score of 0.8. Thus the test group who has undergone septoplasty with inferior turbinoplasty has improvement of symptoms by 54.34% when compared to the control group who have undergone septoplasty alone who has improvement of symptoms by 23.52%. Here the parameter nasal obstruction is taken into account.

Independent Samples Test

		vene's Test f ality of Varian		t-test for Equality of Means						
									5% Confidenc nterval of the Difference	
		F	Sig.	t	df	. (2-taile	Mean fferenc	td. Erro fferenc	Lower	Upper
NASAL OBS - PREOP	Equal va assumed	4.934	.031	1.745	48	.087	-.280	.160	-.603	.043
	Equal va not assu			1.745	4.149	.088	-.280	.160	-.603	.043
NASAL OBS - POSTOP	Equal va assumed	1.274	.265	6.663	48	.000	.920	.138	.642	1.198
	Equal va not assu			6.663	7.885	.000	.920	.138	.642	1.198

The above mentioned table shows that the when the variances are equally assumed the p value while comparing the nasal obstruction parameter between the control and the test group is 0.087 in pre op symptom score and 0.000 in postop symptom score and the latter is less than 0.05 hence the comparison is statistically significant.



The above mentioned bar diagram is plotted by comparing the symptomatic improvement among the control group who have undergone septoplasty alone and the test group who have undergone septoplasty with inferior turbinoplasty taking the parameter – **facial pain** into account. We can notice the increased improvement in symptoms in the test group

Group Statistics

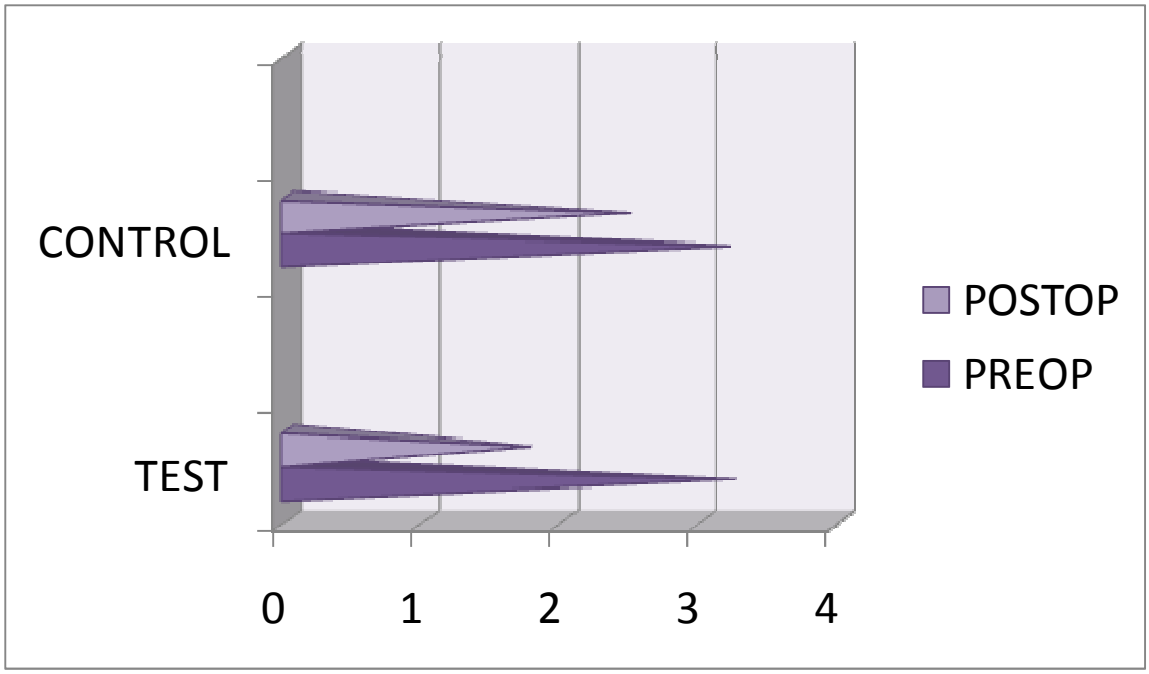
	GROUP	N	Mean	td. Deviatio	Std. Error Mean
FACIAL PAIN - PI	SEPTOPLASTY	25	3.00	.577	.115
	SEPTOPLASTY TUBINOPLASTY	25	3.24	.436	.087
FACIAL PAIN - PO	SEPTOPLASTY	25	2.08	.493	.099
	SEPTOPLASTY TUBINOPLASTY	25	1.56	.507	.101

In the above mentioned table the test group has a mean reduction in symptom score of 1.56 while the control group has a mean reduction in symptom score of 0.92. Thus the test group who have undergone septoplasty with inferior turbinoplasty have improvement of symptoms by 48.14% when compared to the control group who have undergone septoplasty alone who has improvement of symptoms by 30.66%. Here the parameter facial pain is taken into account.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
FACIAL PAIN - PRE(	Equal variance assumed	.180	.673	-1.659	48	.104	-.240	.145	-.531	.051
	Equal variance not assumed			-1.659	44.651	.104	-.240	.145	-.531	.051
FACIAL PAIN - POS'	Equal variance assumed	6.278	.016	3.677	48	.001	.520	.141	.236	.804
	Equal variance not assumed			3.677	47.966	.001	.520	.141	.236	.804

The above mentioned table shows that the when the variances are equally assumed the p value while comparing the facial pain parameter between the control and the test group is 0.104 in pre op symptom score and 0.001 in postop symptom score and the latter is less than 0.05 hence the comparison is statistically significant.



The above mentioned diagram is plotted by comparing the symptomatic improvement among the control group who have undergone septoplasty alone and the test group who have undergone septoplasty with inferior turbinoplasty taking the parameter – **DIFFICULTY IN FALLING ASLEEP** into account. We can notice the increased improvement in symptoms in the test group. The parameter included in this study falls under lifestyle improvement category.

Group Statistics

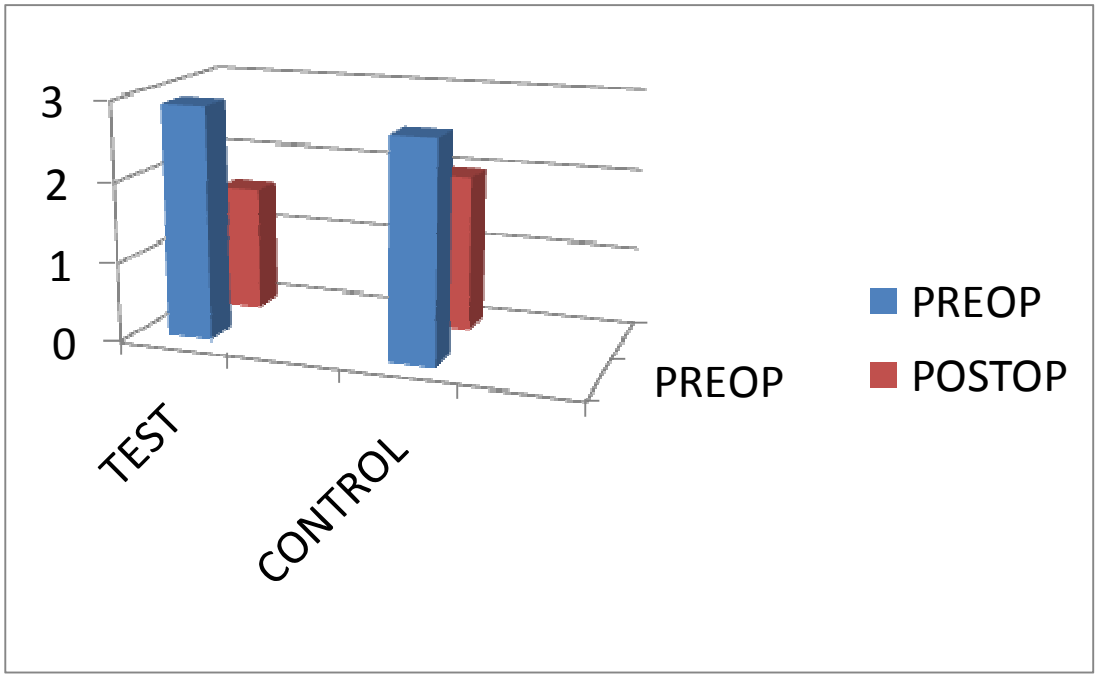
	GROUP	N	Mean	Std. Deviation	Std. Error Mean
DIFFICULTY IN SLEEP - PREC	SEPTOPLASTY	25	3.20	.645	.129
	SEPTOPLASTY W TUBINOPLASTY	25	3.24	.597	.119
DIFFICULTY IN SLEEP - POST	SEPTOPLASTY	25	2.48	.510	.102
	SEPTOPLASTY W TUBINOPLASTY	25	1.76	.436	.087

In the above mentioned table the test group has a mean reduction in symptom score of 1.48 while the control group has a mean reduction in symptom score of 0.72. Thus the test group who have undergone septoplasty with inferior turbinoplasty have improvement of symptoms by 45.67% when compared to the control group who have undergone septoplasty alone and they have improvement of symptoms by 22.5%. Here the parameter difficulty in falling asleep is taken into account.

Independent Samples Test

		Levene's Test for quality of Variance		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	ig. (2-tailed	Mean Difference	Std. Error Difference	Lower	Upper
DIFFICULTY I SLEEP - PRE	Equal varian assumed	.065	.801	-.227	48	.821	-.040	.176	-.394	.314
	Equal varian not assumed			-.227	47.713	.821	-.040	.176	-.394	.314
DIFFICULTY I SLEEP - POS	Equal varian assumed	8.719	.005	5.367	48	.000	.720	.134	.450	.990
	Equal varian not assumed			5.367	46.866	.000	.720	.134	.450	.990

The above mentioned table shows that the when the variances are equally assumed the p value while comparing the difficulty in falling asleep parameter between the control and the test group is 0.821 in pre op symptom score and 0.000 in postop symptom score the latter is less than 0.05 hence the comparison is statistically significant.



The above mentioned bar diagram is plotted by comparing the symptomatic improvement among the control group who have undergone septoplasty alone and the test group who have undergone septoplasty with inferior turbinoplasty taking the parameter – **REDUCED CONCENTRATION IN WORK** into account. We can notice the increased improvement in symptoms in the test group. The parameter included in this study falls under lifestyle improvement category.

Group Statistics

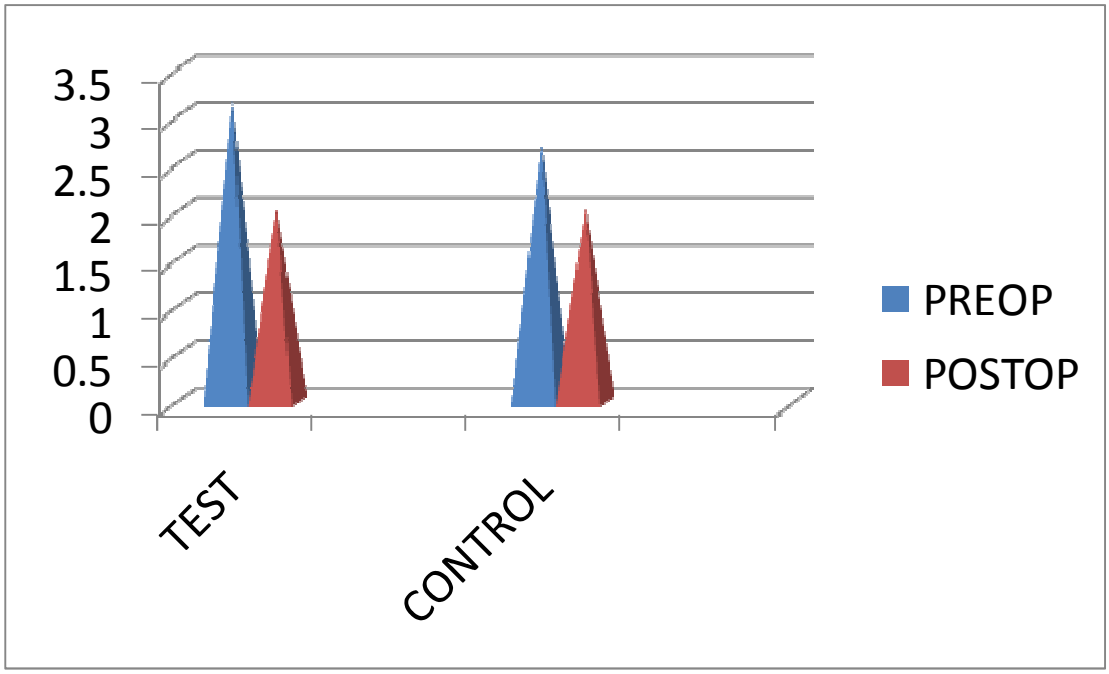
	GROUP	N	Mean	Std. Deviation	Std. Error Mean
REDUCED CONCENTRATION - PREOP	SEPTOPLASTY	25	2.72	.614	.123
	SEPTOPLASTY WITH TUBINOPLASTY	25	2.92	.640	.128
REDUCED CONCENTRATION - POSTOP	SEPTOPLASTY	25	1.96	.455	.091
	SEPTOPLASTY WITH TUBINOPLASTY	25	1.56	.507	.101

In the above mentioned table the test group has a mean reduction in symptom score of 1.36 while the control group has a mean reduction in symptom score of 0.76. Thus the test group who have undergone septoplasty with inferior turbinoplasty have improvement of symptoms by 46.57% when compared to the control group who have undergone septoplasty alone and they have improvement of symptoms by 27.94%. Here the parameter reduced concentration is taken into account.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
REDUCED CONCENTRATIOI PREOP	Equal variance assumed	.486	.489	-1.127	48	.265	-.200	.177	-.557	.157
	Equal variance not assumed			-1.127	47.914	.265	-.200	.177	-.557	.157
REDUCED CONCENTRATIOI POSTOP	Equal variance assumed	11.101	.002	2.938	48	.005	.400	.136	.126	.674
	Equal variance not assumed			2.938	47.447	.005	.400	.136	.126	.674

The above mentioned table shows that the when the variances are equally assumed the p value while comparing the reduced concentration parameter between the control and the test group is 0.265 in pre op symptom score and 0.005 in postop symptom score the latter is less than 0.05 hence the comparison is statistically significant.



The above mentioned diagram is plotted by comparing the symptomatic improvement among the control group who have undergone septoplasty alone and the test group who have undergone septoplasty with inferior turbinoplasty taking the parameter – **IRRITABILITY** into account. We can notice the increased improvement in symptoms in the test group. The parameter included in this study falls under lifestyle improvement category.

Group Statistics

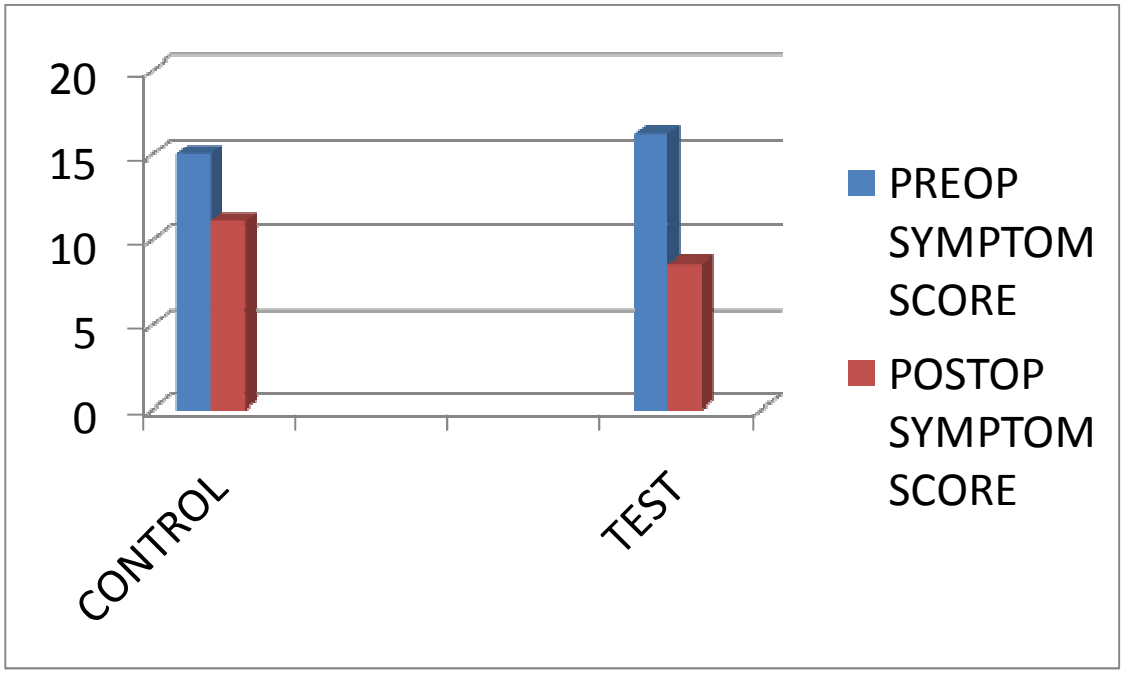
	GROUP	N	Mean	td. Deviatio	Std. Error Mean
IRRITABILITY - P	SEPTOPLASTY	25	2.72	.614	.123
	SEPTOPLASTY TUBINOPLASTY	25	3.16	.554	.111
IRRITABILITY - P	SEPTOPLASTY	25	2.04	.351	.070
	SEPTOPLASTY TUBINOPLASTY	25	2.04	.455	.091

In the above mentioned table the test group have a mean reduction in symptom score of 1.12 while the control group have a mean reduction in symptom score of 0.68. Thus the test group who have undergone septoplasty with inferior turbinoplasty has improvement of symptoms by 35.44% when compared to the control group who have undergone septoplasty alone who has improvement of symptoms by 25%. Here the parameter irritability is taken into account.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
IRRITABILITY - PREC	Equal variances assumed	1.418	.240	-2.661	48	.011	-.440	.165	-.772	-.108
	Equal variances not assumed			-2.661	47.502	.011	-.440	.165	-.773	-.107
IRRITABILITY - POST	Equal variances assumed	.590	.446	.000	48	1.000	.000	.115	-.231	.231
	Equal variances not assumed			.000	45.123	1.000	.000	.115	-.231	.231

The above mentioned table shows that the when the variances are equally assumed the p value while comparing the parameter, irritability between the control and the test group is 0.011 in pre op symptom score and 0.01 in postop symptom score the latter is less than 0.05 hence the comparison is statistically significant.



The above mentioned bar diagram is plotted by comparing the symptomatic improvement among the control group who have undergone septoplasty alone and the test group who have undergone septoplasty with inferior turbinoplasty taking the parameter – **TOTAL SYMPTOM SCORE** into account. We can notice the increased improvement in symptom score in the test group.

Group Statistics

	GROUP	N	Mean	d. Deviatic	td. Erro Mean
TOTAL SCORE -	SEPTOPLAST	25	15.04	1.837	.367
	SEPTOPLAST TUBINOPLAS	25	16.24	1.393	.279
TOTAL SCORE -	SEPTOPLAST	25	11.16	1.106	.221
	SEPTOPLAST TUBINOPLAS	25	8.60	1.190	.238

In the above mentioned table the improvement in symptom score in the patients undergone both septoplasty and inferior turbinoplasty is a mean value of 7.64 while the patients who have undergone septoplasty alone have an improvement in score by a mean value of 3.88. Thus the patients in the test group have more improvement in symptoms than that of the control group. Thus there is a 47.04% overall improvement in symptoms in test group and there is a 25.79% overall improvement in symptoms in the control group.

Independent Samples Test

		Levene's Test for Equality of Variance		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
TOTAL SCORE -	Equal variances assumed	.932	.339	-2.603	48	.012	-1.200	.461	-2.127	-.273
	Equal variances not assumed			-2.603	44.744	.012	-1.200	.461	-2.129	-.271
TOTAL SCORE -	Equal variances assumed	.225	.637	7.878	48	.000	2.560	.325	1.907	3.213
	Equal variances not assumed			7.878	47.744	.000	2.560	.325	1.907	3.213

The above mentioned table shows that the when the variances are equally assumed the p value while comparing the total symptom score between the control and the test group is 0.012 in pre op symptom score and 0.000 in postop symptom score which is less than 0.05, hence the comparison is statistically significant.

Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
NASAL OBSTRUCTIO	SEPTOPLASTY	25	.80	.408	.082
	SEPTOPLASTY WITH TUBINOPLASTY	25	2.00	.645	.129
FACIAL PAIN	SEPTOPLASTY	25	.92	.277	.055
	SEPTOPLASTY WITH TUBINOPLASTY	25	1.68	.748	.150
DIFFICULTY IN SLEEF	SEPTOPLASTY	25	.72	.458	.092
	SEPTOPLASTY WITH TUBINOPLASTY	25	1.48	.510	.102
REDUCED CONCENTRATION	SEPTOPLASTY	25	.76	.436	.087
	SEPTOPLASTY WITH TUBINOPLASTY	25	1.36	.810	.162
IRRITABILITY	SEPTOPLASTY	25	.68	.476	.095
	SEPTOPLASTY WITH TUBINOPLASTY	25	1.12	.526	.105
TOTAL SCORE	SEPTOPLASTY	25	3.88	1.054	.211
	SEPTOPLASTY WITH TUBINOPLASTY	25	7.64	1.604	.321

The above mentioned table shows the mean difference in individual symptom score preop and postop of both the control group who have undergone septoplasty alone and the test group who have undergone septoplasty with inferior turbinoplasty. We can notice the score improvement is more among the test group than the control population in all parameters.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
NASAL OBSTRUCTI	Equal variances assumed	.516	.476	-7.856	48	.000	-1.200	.153	-1.507	-.893
	Equal variances not assumed			-7.856	40.552	.000	-1.200	.153	-1.509	-.891
FACIAL PAIN	Equal variances assumed	37.550	.000	-4.762	48	.000	-.760	.160	-1.081	-.439
	Equal variances not assumed			-4.762	30.451	.000	-.760	.160	-1.086	-.434
DIFFICULTY IN SLE	Equal variances assumed	5.610	.022	-5.543	48	.000	-.760	.137	-1.036	-.484
	Equal variances not assumed			-5.543	47.463	.000	-.760	.137	-1.036	-.484
REDUCED CONCENTRATION	Equal variances assumed	13.199	.001	-3.260	48	.002	-.600	.184	-.970	-.230
	Equal variances not assumed			-3.260	36.815	.002	-.600	.184	-.973	-.227
IRRITABILITY	Equal variances assumed	.978	.328	-3.101	48	.003	-.440	.142	-.725	-.155
	Equal variances not assumed			-3.101	47.531	.003	-.440	.142	-.725	-.155
TOTAL SCORE	Equal variances assumed	5.312	.026	-9.796	48	.000	-3.760	.384	-4.532	-2.988
	Equal variances not assumed			-9.796	41.457	.000	-3.760	.384	-4.535	-2.985

The above mentioned table shows that the when the variances are equally assumed the p value while comparing the symptom score including all parameters between the control and the test group in pre op symptom score and in postop symptom score is less than 0.05, hence the comparison is statistically significant.

			GROUP	
			SEPTOPLASTY	SEPTOPLASTY WITH TURBINOPLASTY
ADEQUATE	RIGHT	COUNT % WITHIN GROUP	5 20%	0 0%
	LEFT	COUNT % WITHIN GROUP	9 36%	0 0%
	B/L	COUNT % WITHIN GROUP	0 0%	25 100%
TOTAL		COUNT % WITHIN GROUP	14 56%	25 100%

In the above mentioned table the DNE first pass adequacy is compared between the test group and the control group. The table shows that in all the 25 patients belonging to the test group who have undergone combined septoplasty and inferior turbinoplasty the first pass in DNE using 0 degree 4mm Hopkins rod lens endoscope is adequate. While only in 5 patients among the 25 patients of the control group have an adequate first pass in DNE on the right side and 9 patients have an adequate first pass on the left side. Which shows that the test group have achieved an adequate airway than the control group.

			GROUP	
			SEPTOPLASTY	SEPTOPLASTY WITH TURBINOPLASTY
INADEQUATE	RIGHT	COUNT % WITHIN GROUP	9 36%	0 0%
	LEFT	COUNT % WITHIN GROUP	5 20%	0 0%
	B/L	COUNT % WITHIN GROUP	11 44%	0 0%
TOTAL		COUNT % WITHIN GROUP	25 100%	0 0%

In the above mentioned table the DNE first pass inadequacy is compared between the test group and the control group. The table shows that in all the 25 patients belonging to the test group who have undergone combined septoplasty and inferior turbinoplasty the first pass in DNE using 0 degree 4mm Hopkins rod lens endoscope, no patients have an inadequate first pass. While 11 patients among the 25 patients of the control group have an inadequate first pass in DNE bilaterally and inadequate first pass on right side in 9 patients and inadequate first pass

on left side in 5 patients. Which shows that the test group have achieved an adequate airway than the control group.

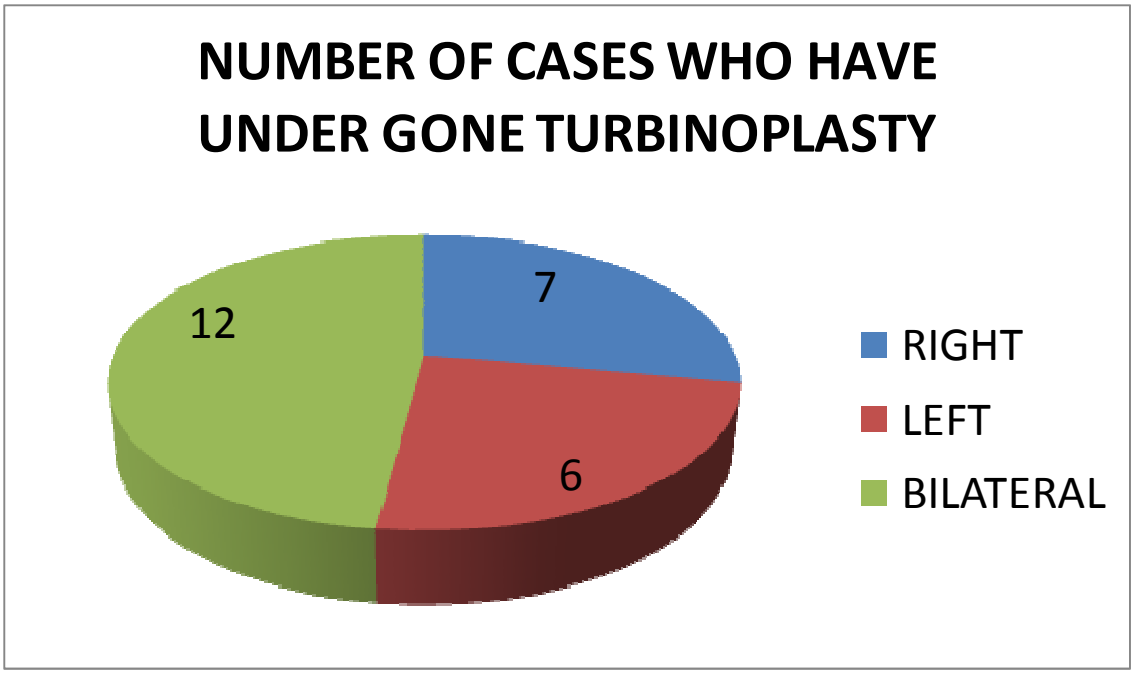
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Squa	27.000[b]	1	.000		
Continuity Correcti[a]	14.388	1	.000		
Likelihood Ratio	14.259	1	.000		
Fisher's Exact Tes				.003	.003
Linear-by-Linear Association	26.000	1	.000		
N of Valid Cases	27				

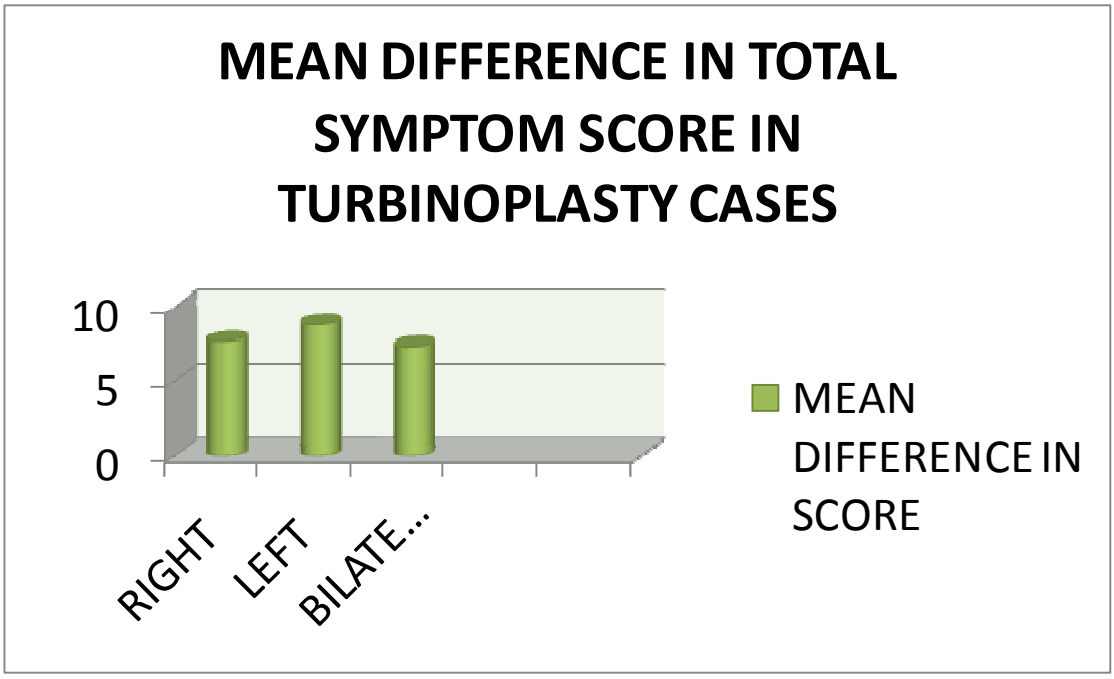
a. Computed only for a 2x2 table

b. 3 cells (75.0%) have expected count less than 5. The minimum expec 15.

The above mentioned table shows that the when the variances are equally assumed the p value while comparing the DNE adequacy and inadequacy between the control and the test group postop is 0.000 which is less than 0.05, hence the comparison is statistically significant



In the total of 25 cases in the test group 7 cases have undergone right turbinoplasty, 6 cases have undergone left turbinoplasty and 12 cases have undergone bilateral turbinoplasty all in combination with septoplasty.



The above mentioned chart is plotted by comparing the mean difference in total score of symptomatic improvement among the cases who have undergone right, left and bilateral turbinoplasty. It can be noticed that there is not much difference in symptomatic improvement.

GROUP				N	MEAN	Std.Deviation
TOTAL SCORE	PREOP	TURBINOPLASTY	RIGHT	7	16.71	1.293
			LEFT	6	16.66	1.326
			BILATERAL	12	15.75	1.731
TOTAL SCORE	POSTOP	TURBINOPLASTY	RIGHT	7	9.0	1.012
			LEFT	6	7.83	1.293
			BILATERAL	12	8.41	1.213

In the above mentioned table the mean symptom score preop and postop is compared between the patients who have undergone right, left and bilateral turbinoplasty with septoplasty. It can be noticed that those patients who have undergone right turbinoplasty have a mean reduction in symptom score by 7.71, those patients who have undergone left turbinoplasty have a mean reduction by 8.83 and those who have undergone bilateral turbinoplasty have a mean reduction by 7.34. This shows that there is not much difference in symptomatic improvement between these patients

Independent Samples Test

		Levene's Test for Equality of Variance		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
TOTAL SCORE - PREOP	Equal variances assumed	.932	.339	-2.603	48	.712	-1.200	.461	-2.127	-.273
	Equal variances not assumed			-2.603	44.744	.712	-1.200	.461	-2.129	-.271
TOTAL SCORE - POSTOP	Equal variances assumed	.225	.637	7.878	48	.835	2.560	.325	1.907	3.213
	Equal variances not assumed			7.878	47.744	.835	2.560	.325	1.903	3.213

The above mentioned table shows that when the variances are equally assumed the p value while comparing the total symptom score between the patients who have undergone right, left and bilateral turbinoplasty in combination with septoplasty in pre op is 0.712 and in post op is 0.835 which is more than 0.05, hence the comparison is **not** statistically significant.

DISCUSSION

The study was started with the aim of comparing the outcome of septoplasty and septoplasty combined with inferior turbinoplasty in the the patients with deviated nasal septum with inferior turbinate hypertrophy either unilateral or bilateral. The study population chosen was scrutinized with proper implementation of the inclusion criteria. The patients who developed upper respiratory tract infections and sinusitis after enrolling into the study or during the process of preparation for anaesthetic fitness were excluded from the study. The patients who had allergic symptoms and vasomotor rhinitis and related symptomatology were excluded from the study. Also patients with confounding factors altering the healing like those who are diabetic, hypertensive or coronary artery disease taking aspirin were excluded from the study.

The overall improvement in symptoms is 47.04% in test group who have undergone combined septoplasty amd turbinoplasty while it is 25.79% in the control group who have undergone septoplasty alone according to the statistical analysis of the symptom score. Patients were allotted into the particular group by quasi randomisation by taking all the odd numbers into control group and even numbers into the test group. The study was double blinded.

DEMOGRAPHY

The 50 patients were distributed in control group(25) and study group(25). The age group included in the study is 20 to 45 years. This age group is particularly chosen because of the reliability of the answers to the questionnaires put forward and to decrease the morbidity of the procedure in extremes of age group.

The sex distribution in the study groups were 64% males and 36% females in test group and 80% males and 20% females in control group.

SYMPTOMATOLOGY

Patients presenting with history of nasal obstruction, facial pain and other symptoms related to lifestyle characteristics like difficulty in falling asleep, irritability, reduced concentration in work spot were considered for the study. A preliminary diagnostic nasal endoscopy is done in all the patients and a CT paranasal sinus is taken. The patients showing deviated nasal septum with or without septal spur with inferior turbinate hypertrophy in both DNE and CTPNS either unilateral or bilateral who have no other allergic complaints were scrutinized and were taken for study.

ANALYSIS

On analyzing the results of the statistics the test group has an improvement in nasal obstruction by 54.34% when compared to the control group who has improvement of symptoms by 23.52%. The test group has a decreased facial pain of 48.14% when compared to the control who has improvement in facial pain by 30.66%. The test group has a decreased difficulty in falling asleep after the procedure by 45.67% when comparing with the control group who has a difference of 22.5%. The test group has an improvement in concentration by 46.57% when compared to the control group who has an improvement of concentration by 27.94%. And a total improvement in the symptom score in the test population is 47.04% while that of the control group is 25.79%.

The first pass in DNE done using 0 degree 4mm hopkins rodlens endoscope is adequate on both nasal cavities in all patients who have undergone septoplasty with inferior turbinoplasty while in the patients who have undergone septoplasty alone only 5 patients among the 25 patients of the control group have an adequate first pass in DNE on the right side and 9 patients have an adequate first pass on the left side.

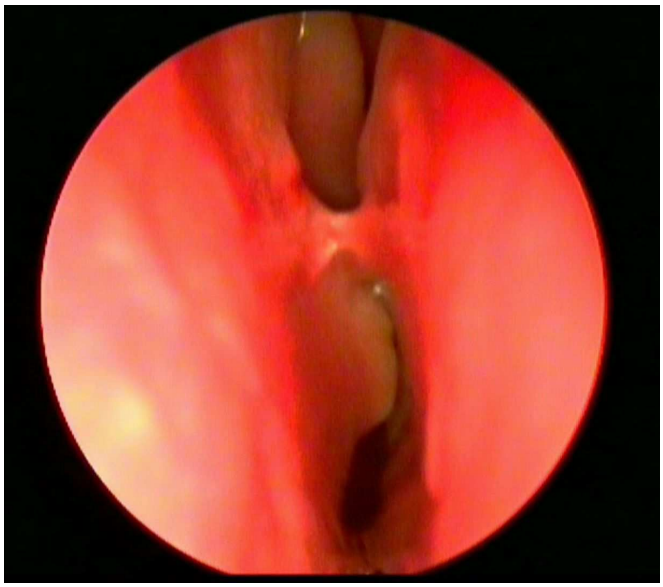
The preoperative bleeding during turbinoplasty is very negligible when done in local as well as general anaestheia. The postoperative pain is also minimal which responded well to analgesics.

S.No	YEAR	AUTHOR	PARAMETERS COMPARED	
			ORIGINAL STUDY	MY STUDY
1	1999	Michael Friedman, MD et al	No crusting or atrophic changes	No crusting or atrophic changes
2	2002	Lee CF, Chen TA	No synechiae or atrophic changes	No synechiae or atrophic changes
3	2002	Lee CF, Chen TA	Nasal obstruction improved in 91%	Nasal obstruction improves in 100 %
4	2010	Bhandarkar N D	Usage of medications can be reduced by turbinoplasty procedures	Usage of decongestants and medications have reduced in test population
5	1993	Ilium P et al	No subjective benefit in contralateral turbinoplasty	Subjective benefit has been noted in contralateral turbinoplasty

In this study the patients were followed up from 6 months to a maximum period of 1 year and those patients who have undergone

combined septoplasty and inferior turbinoplasty using microdebrider have no crusting or any atrophic changes. A similar study was performed by **Michael Friedman, MD et al** in **November 1999** who studied on 120 patients and concluded that “microdebrider assisted submucous resection of inferior turbinates” is a safe method of achieving turbinate bulk reduction with acceptable morbidity in patients with nasal airway obstruction secondary to turbinate disease. Bleeding is a rare. Preservation of mucosa leads to absence of crusting, early healing and avoidance of exposed bone. The microdebrider technique lends to precise tissue removal with satisfactory reduction of inferior turbinate size.

Three patients belonging to the control group had synechiae, two patients had synechiae on the left nasal cavity and one patient had synechiae on both sides between the septum and inferior turbinate.



None of the patients in the test group had synechiae or crusting. A similar study was conducted by **Lee CF, Chen TA, (Nov 2001 to Dec 2002)** on 29 patients with chronic hypertrophic rhinitis treated with power endoscopic inferior turbinoplasty and followed up for an average of 15.3 months after surgery. Average nasal airflow increased. Permanent synechiae and atrophic change has not been observed.

The nasal obstruction has improved in all the test population (100%). In the same study conducted by **Lee CF, Chen TA, (Nov 2001 to Dec 2002)** he concluded that there is a overall improvement in nasal obstruction by 91%. They concluded that Powered endoscopic turbinoplasty is a safe and effective method for treatment of chronic hypertrophic rhinitis, in adjunct to endoscopic septoplasty or sinusurgery and appears to provide a surgical choice for minimal disease clearance.

A study by **Bandos R D et al** concluded that satisfactory relief of nasal obstruction was seen following septoplasty with partial inferior turbinectomy rather than septoplasty alone.

The postoperative usage of decongestants and other drugs have also been decreased in the test population than the study population which can be compared to a study conducted by **Bhandarkar N D et al in 2010** who concluded that inferior turbinate surgery results in favorable

outcomes and continues to be recommended as a treatment for turbinate hypertrophy not responsive to medical therapy.

In my study there is an improvement in symptoms of the patient by combining septoplasty and inferior turbinoplasty performing turbinoplasty either same side or the opposite side of the septal deviation in contrary to a controlled, randomized study by **ilium P in 1993** on 45 patients who showed no subjective benefits from inferior turbinoplasty on the side opposite to the septal deviation, regardless of the degree of deviation either in short ot long term.

LIMITATIONS OF STUDY

1) Rhinomanometry is not available to calculate the airway resistance.

2) The nasal flow meter to assess the nasal airway patency is not available.

3) The confounding factors like age and sex of the patient and side of the nasal septal deviation and turbinate hypertrophy were not eliminated.

CONCLUSION

The advent of endoscope has revolutionized the treatment of nasal conditions. With the help of the endoscope precise incremental tissue removal of the inferior turbinate with the help of microdebrider is possible.

Symptomatically exciting improvement is observed in the test group who have undergone septoplasty with inferior turbinoplasty both immediate as well as long term than those patients who have undergone septoplasty alone. Hence turbinoplasty is a useful adjunct procedure to septoplasty producing excellent results.

There is also an appreciable increase in nasal breathing space as observed in preop and post op DNE findings in the test group in comparison with the control group.

The associated morbidities of inferior turbinate surgeries like atrophic changes, crusting and exposure of bare bone which is common in other extensive inferior turbinate procedures is very negligible in submucosal debridement of inferior turbinate.

Hence septoplasty combined with inferior turbinoplasty has superior efficacy when compared to septoplasty alone in selected cases having deviated nasal septum with inferior turbinate hypertrophy.

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ANNEXURE – 1

PROFORMA

ASSESSMENT OF SYMPTOMS OF PATIENT BEFORE AND AFTER SURGERY

NAME:

AGE: IP NO: DATE:

PREOP CTPNS FINDING:

PREOP DNE FINDING:

TIME OF ASSESSMENT: PRE OP/POST OP

IF POST OP, HOW MANY WEEKS LATER

PROCEDURE:

POSTOP DNE FINDINGS: ADEQUATE INADEQUATE

Score 0 – nil symptoms

Score 1 – mild

Score 2 - moderate

Score 3 – moderately severe

Score 4 – severe

Score 5 – very severe

S.NO	QUESTIONAIRE	SCORES					
1	NASAL OBSTRUCTION	0	1	2	3	4	5
2	FACIAL PAIN/PRESSURE	0	1	2	3	4	5
3	DIFFICULTY IN FALLING ASLEEP	0	1	2	3	4	5
4	REDUCED CONCENTRATION	0	1	2	3	4	5
5	FRUSTRATED/RESTLESS/IRRITABLE	0	1	2	3	4	5

PATIENT CONSENT FORM

Study Detail	:	COMPARISON OF OUTCOME OF SEPTOPLASTY AND SEPTOPLASTY COMBINED WITH INFERIOR TURBINOPLASTY IN CASES OF DEVIATED NASAL SEPTUM WITH INFERIOR TURBINATE HYPERTROPHY
Study Centre	:	Upgraded institute of otorhinolaryngology Madras medical college, Chennai – 600003
Patient's Name	:	
Patient's Age	:	
Identification Number	:	

Patient may check (☑) these boxes

I confirm that I have understood the purpose of procedure for the above study. I have the opportunity to ask question and all my questions and doubts have been answered to my complete satisfaction. ❑

I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving reason, without my legal rights being affected. ❑

I understand that sponsor of the clinical study, others working on the sponsor's behalf, the ethical committee and the regulatory authorities will not need my permission to look at my health records, both in respect of current study and any further research that may be conducted in relation to it, even if I withdraw ❑

from the study I agree to this access. However, I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from this study.

I agree to take part in the above study and to comply with the instructions given during the study and faithfully cooperate with the study team and to immediately inform the study staff if I suffer from any deterioration in my health or well being or any unexpected or unusual symptoms. ❑

I hereby consent to participate in this study. ❑

I hereby give permission to undergo complete clinical examination , biochemical, surgical procedure. ❑

Signature of Investigator

Signature/thumb impression

Study Investigator's Name:

Patient's Name and Address:

Dr.VIJAY PRADAP.R.,

ANNEXURE - 2

MASTER CHART

S.NO	AGE	SEX	PREOP SYMPTOM SCORE						DNE	CTPNS	SEP	TURB	POSTOP SYMPTOM SCORE						DNE POSTOP	
																			Adeq	Inadeq
			NAS. OBS	FA. PAIN	DIFF INSLP	RED. CONC	IRRI	TOTAL					NAS. OBS	FA. PAIN	DIFF INSLP	RED. CONC	IRRI	TOT. SCO	FIRST PASS	
1	44	M	4	3	4	3	3	17	DSL WITH SEPTAL SPUR WITH RT ITH	DSL WITH SEPTAL SPUR WITH RT ITH	YES	NO	3	2	3	2	2	12	INADEQUATE ON RIGHT	
2	25	M	3	3	4	3	2	15	DSL WITH SEPTAL SPUR WITH RT ITH	DSL WITH SEPTAL SPUR WITH RT ITH	YES	NO	2	2	3	2	2	11	INADEQUATE ON RIGHT	
3	34	M	4	3	2	3	2	14	DSL WITH SEPTAL SPUR WITH RT ITH	DSL WITH SEPTAL SPUR WITH RT ITH	YES	NO	3	2	2	2	2	11	INADEQUATE B/L	
4	42	M	3	3	3	2	2	13	DSR WITH SEPTAL SPUR WITH LEFT ITH	DSR WITH SEPTAL SPUR WITH LEFT ITH	YES	NO	2	2	3	1	1	9	INADEQUATE B/L	
5	27	F	4	3	4	3	3	17	DSL WITH SEPTAL SPUR WITH RT ITH	DSL WITH SEPTAL SPUR WITH RT ITH	YES	NO	3	2	3	2	2	12	INADEQUATE RT ,SEPTAL PERFORATION	
6	22	M	4	2	3	3	3	15	DSL WITH SEPTAL SPUR WITH RT ITH	DSL WITH SEPTAL SPUR WITH RT ITH	YES	NO	3	2	2	2	2	11	INADEQUATE BOTH SIDES	
7	49	M	3	3	3	3	2	14	DSL WITH SEPTAL SPUR WITH RT ITH	DSL WITH SEPTAL SPUR WITH RT ITH	YES	NO	2	2	2	2	2	10	INADEQUATE RT SIDE	
8	23	M	3	4	4	3	4	18	DSR WITH SEPTAL SPUR WITH LEFT ITH	DSR WITH SEPTAL SPUR WITH LEFT ITH	YES	NO	2	3	3	2	3	13	INADEQUATE BOTH SIDES	
9	26	M	4	3	3	4	3	17	DSL WITH SEPTAL SPUR WITH RT ITH	DSL WITH SEPTAL SPUR WITH RT ITH	YES	NO	3	2	2	3	2	12	INADEQUATE RT SIDE	
10	27	M	3	4	3	2	3	15	DSR WITH SEPTAL SPUR WITH LEFT ITH	DSR WITH SEPTAL SPUR WITH LEFT ITH	YES	NO	3	3	2	1	2	11	INADEQUATE LT SIDE	

11	29	M	2	2	3	2	3	12	DSL WITH SEPTAL SPUR WITH RT ITH	DSL WITH SEPTAL SPUR WITH RT ITH	YES	NO	2	1	2	2	2	9	INADEQUATE BOTH SIDES
12	27	M	4	3	3	2	3	15	DSL WITH SEPTAL SPUR WITH RT ITH	DSL WITH SEPTAL SPUR WITH RT ITH	YES	NO	3	2	3	1	2	11	INADEQUATE BOTH SIDES
13	28	M	3	3	2	2	2	12	DSL WITH SEPTAL SPUR WITH RT ITH	DSL WITH SEPTAL SPUR WITH RT ITH	YES	NO	3	2	2	2	2	11	SYNECHIAE LEFT SIDE,INADEQUATE B/L
14	34	M	4	3	4	3	3	17	DSR WITH SEPTAL SPUR WITH LEFT ITH	DSR WITH SEPTAL SPUR WITH LEFT ITH	YES	NO	3	2	3	2	2	12	SYNECHIAE BOTH SIDES OF NASAL SEPTUM
15	24	M	3	3	4	3	2	15	DSL WITH SEPTAL SPUR WITH RT ITH	DSL WITH SEPTAL SPUR WITH RT ITH	YES	NO	2	2	3	2	2	11	SYNECHIAE LEFT SIDE,INADEQUATE B/L
16	24	M	4	3	2	3	2	14	DSL WITH SEPTAL SPUR WITH B/L ITH	DSL WITH SEPTAL SPUR WITH B/L ITH	YES	NO	3	2	2	2	2	11	INADEQUATE BOTH SIDES
17	32	M	3	3	3	2	2	13	DSL WITH SEPTAL SPUR WITH B/L ITH	DSL WITH SEPTAL SPUR WITH B/L ITH	YES	NO	2	2	3	2	2	11	INADEQUATE RT SIDE
18	42	M	4	3	4	3	3	17	DSR WITH SEPTAL SPUR WITH LEFT ITH	DSR WITH SEPTAL SPUR WITH LEFT ITH	YES	NO	3	2	3	2	2	12	INADEQUATE LEFT SIDE
19	36	M	4	2	3	3	3	15	DSL WITH SEPTAL SPUR WITH RT. ITH	DSL WITH SEPTAL SPUR WITH RT. ITH	YES	NO	3	2	2	2	2	11	INADEQUATE RT SIDE
20	34	M	3	3	3	3	2	14	DSL WITH SEPTAL SPUR WITH RT. ITH	DSL WITH SEPTAL SPUR WITH RT. ITH	YES	NO	2	2	2	2	2	10	INADEQUATE RT SIDE
21	34	F	3	4	4	3	4	18	DSR WITH SEPTAL SPUR WITH LEFT ITH	DSR WITH SEPTAL SPUR WITH LEFT ITH	YES	NO	2	3	3	2	3	13	INADEQUATE LEFT SIDE
22	21	F	4	3	3	4	3	17	DSR WITH SEPTAL SPUR WITH LEFT ITH	DSR WITH SEPTAL SPUR WITH LEFT ITH	YES	NO	3	2	2	3	2	12	INADEQUATE LT SIDE
23	25	M	3	4	3	2	3	15	DSL WITH SEPTAL SPUR WITH RT. ITH	DSL WITH SEPTAL SPUR WITH RT. ITH	YES	NO	3	3	2	2	2	12	INADEQUATE RT SIDE
24	28	F	2	2	3	2	3	12	DSR WITH SEPTAL SPUR WITH LEFT ITH	DSR WITH SEPTAL SPUR WITH LEFT ITH	YES	NO	2	1	2	2	2	9	INADEQUATE LEFT SIDE
25	30	F	4	3	3	2	3	15	DSL WITH SEPTAL SPUR WITH RT. ITH	DSL WITH SEPTAL SPUR WITH RT. ITH	YES	NO	3	2	3	2	2	12	INADEQUATE BOTH SIDES

26	23	M	4	3	3	2	3	15	DSR WITH SEPTAL SPUR WITH LEFT ITH	DSR WITH SEPTAL SPUR WITH LEFT ITH	YES	YES B/L	2	2	1	2	2	9	ADEQUATE BOTH SIDES
27	32	M	3	3	2	3	2	13	DSR WITH SEPTAL SPUR WITH B/L ITH	DSR WITH SEPTAL SPUR WITH B/L ITH	YES	YES B/L	1	2	1	2	1	7	ADEQUATE BOTH SIDES
28	35	F	4	3	3	4	3	17	DSR WITH SEPTAL SPUR WITH LEFT ITH	DSR WITH SEPTAL SPUR WITH LEFT ITH	YES	YES LEFT	2	2	1	2	2	9	ADEQUATE BOTH SIDES
29	21	F	4	3	4	3	3	17	DSL WITH SEPTAL SPUR WITH RT ITH	DSL WITH SEPTAL SPUR WITH RT ITH	YES	YES RT	2	2	2	1	2	9	ADEQUATE BOTH SIDES
30	26	M	4	3	3	4	3	17	DSR WITH SEPTAL SPUR WITH LEFT ITH	DSR WITH SEPTAL SPUR WITH LEFT ITH	YES	YES LT	2	1	2	2	2	9	ADEQUATE BOTH SIDES
31	36	M	3	3	4	3	4	17	DSL WITH SEPTAL SPUR WITH B/L ITH	DSL WITH SEPTAL SPUR WITH B/L ITH	YES	YES B/L	2	2	2	2	3	11	ADEQUATE BOTH SIDES
32	44	M	4	3	4	3	4	18	DSL WITH SEPTAL SPUR WITH RT ITH	DSL WITH SEPTAL SPUR WITH RT ITH	YES	YES RT	2	1	2	1	2	8	ADEQUATE BOTH SIDES
33	32	M	4	4	3	3	3	17	DSL WITH SEPTAL SPUR WITH RT. ITH	DSL WITH SEPTAL SPUR WITH RT. ITH	YES	YES RT	1	2	2	1	2	8	ADEQUATE BOTH SIDES
34	26	F	3	4	3	2	3	15	DSL WITH SEPTAL SPUR WITH B/L ITH	DSL WITH SEPTAL SPUR WITH B/L ITH	YES	YES B/L	1	1	2	1	2	7	ADEQUATE BOTH SIDES
35	32	M	4	3	3	3	3	16	DSL WITH SEPTAL SPUR WITH B/L ITH	DSL WITH SEPTAL SPUR WITH B/L ITH	YES	YES B/L	2	1	2	2	2	9	ADEQUATE BOTH SIDES
36	30	F	4	3	3	2	3	15	DSR WITH SEPTAL SPUR WITH LEFT ITH	DSR WITH SEPTAL SPUR WITH LEFT ITH	YES	YES LT	2	2	1	2	2	9	ADEQUATE BOTH SIDES
37	23	F	4	3	3	2	3	15	DSL WITH SEPTAL SPUR WITH B/L ITH	DSL WITH SEPTAL SPUR WITH B/L ITH	YES	YES B/L	1	2	1	2	1	7	ADEQUATE BOTH SIDES
38	48	F	3	3	2	3	2	13	DSL WITH SEPTAL SPUR WITH B/L ITH	DSL WITH SEPTAL SPUR WITH B/L ITH	YES	YES B/L	2	2	1	2	2	9	ADEQUATE BOTH SIDES
39	34	M	4	3	3	4	3	17	DSL WITH SEPTAL SPUR WITH RT. ITH	DSL WITH SEPTAL SPUR WITH RT. ITH	YES	YES RT	2	2	2	1	2	9	ADEQUATE BOTH SIDES
40	27	M	4	3	4	3	3	17	DSR WITH SEPTAL SPUR WITH LEFT ITH	DSR WITH SEPTAL SPUR WITH LEFT ITH	YES	YES LT	2	1	2	2	2	9	ADEQUATE BOTH SIDES

41	23	M	4	3	3	4	3	17	DSL WITH SEPTAL SPUR WITH RT. ITH	DSL WITH SEPTAL SPUR WITH RT. ITH	YES	YES RT	2	2	2	2	3	11	ADEQUATE BOTH SIDES
42	24	M	3	3	4	3	4	17	DSR WITH SEPTAL SPUR WITH B/L ITH	DSR WITH SEPTAL SPUR WITH B/L ITH	YES	YES B/L	2	1	2	1	2	8	ADEQUATE BOTH SIDES
43	23	F	4	3	4	3	4	18	DSL WITH SEPTAL SPUR WITH B/L ITH	DSL WITH SEPTAL SPUR WITH B/L ITH	YES	YES B/L	1	2	2	1	2	8	ADEQUATE BOTH SIDES
44	35	M	4	4	3	3	3	17	DSR WITH SEPTAL SPUR WITH LEFT ITH	DSR WITH SEPTAL SPUR WITH LEFT ITH	YES	YES LT	1	1	2	1	2	7	ADEQUATE BOTH SIDES
45	30	M	3	4	3	2	3	15	DSL WITH SEPTAL SPUR WITH RT. ITH	DSL WITH SEPTAL SPUR WITH RT. ITH	YES	YES RT	2	1	2	2	2	9	ADEQUATE BOTH SIDES
46	39	F	4	3	3	3	3	16	DSL WITH SEPTAL SPUR WITH RT. ITH	DSL WITH SEPTAL SPUR WITH RT. ITH	YES	YES RT	2	1	2	2	2	9	ADEQUATE BOTH SIDES
47	24	M	3	3	4	3	4	17	DSL WITH SEPTAL SPUR WITH B/L ITH	DSL WITH SEPTAL SPUR WITH B/L ITH	YES	YES B/L	2	2	2	2	3	11	ADEQUATE BOTH SIDES
48	27	M	4	3	4	3	4	18	DSR WITH SEPTAL SPUR WITH B/L ITH	DSR WITH SEPTAL SPUR WITH B/L ITH	YES	YES B/L	2	1	2	1	2	8	ADEQUATE BOTH SIDES
49	37	F	4	4	3	3	3	17	DSR WITH SEPTAL SPUR WITH LEFT ITH	DSR WITH SEPTAL SPUR WITH LEFT ITH	YES	YES LT	1	2	2	1	2	8	ADEQUATE BOTH SIDES
50	29	M	3	4	3	2	3	15	DSL WITH SEPTAL SPUR WITH B/L ITH	DSL WITH SEPTAL SPUR WITH B/L ITH	YES	YES B/L	1	1	2	1	2	7	ADEQUATE BOTH SIDES

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI -3
Telephone No : 044 25305301
Fax : 044 25363970

CERTIFICATE OF APPROVAL

To
Dr.R.Vijay Pradap,
PG in MS ENT,
Upgraded Institute of Otorhinolaryngology,
MMC& RGGGH, Chennai -3

Dear Dr.Vijay Pradap,

The Institutional Ethics committee of Madras Medical College, reviewed and discussed your application for approval of the proposal entitled "Comparison of outcome of septoplasty and septoplasty combined with inferior turbinoplasty in a case of deviated spetum with inferior turbinate hypertrophy" No.12042013.

The following members of Ethics Committee were present in the meeting held on 17.04.2013 conducted at Madras Medical College, Chennai -3.

1. Dr.G.SivaKumar, MS FICS FAIS --- Chairperson
2. Prof. Kalai Selvi MD -- Member Secretary
   Director, Instt. of Pharmacology ,MMC, Ch-3 (Incharge)
3. Prof. Shyamraj MD -- Member
   Director i/c , Instt. of Biochemistry , MMC, Ch-3
4. Prof. P. Karkuzhali. MD -- Member
   Prof., Instt. of Pathology, MMC, Ch-3
5. Prof. A. Radhakrishnan MD -- Member
   Prof of Internal Medicine, MMC, Ch-3
6. Prof. S. Deivanayagam MS -- Member
   Prof of Surgery, MMC, Ch-3
7. Thiru. S. Govindsamy. BABL -- Lawyer
8. Tmt. Arnold Saulina MA MSW -- Social Scientist

We approve the proposal conducted in its presented form.
Sd/ Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, and SAE occurring in the course of the study, any changes in the protocol and patients information / informed consent and asks to be provided a copy of the final report.

18/4/13

Member Secretary, Ethics Committee

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First 100 words of your submission

INTRODUCTION Breathing is one of the very basic need for the survival of an individual. The difficulty in breathing not only affects the survival but also the productivity of the individual. Difficulty in breathing may occur because of abnormalities starting from the tip of the nose to the terminal bronchioles and even beyond. Nasal obstruction is one of the prime complaints in the practice of oto-rhino-laryngology.The new diagnostic and therapeutic weaponry has increased the understanding of the underlying anatomical abnormality or pathology. Many times the symptoms doesn't correlate with the findings. A much researched way of management of nasal obstruction will be discussed in my study....